Honeywell

Application Module^{X} Service

AX13-410

Total Plant

Honeywell

Application Module^{X}

Application Module^{X} Service

AX13-410
Release 100/110/200
CE Compliant
3/96

TotalPlant

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The following standard document conventions may be used in this document. Check Section 1 for conventions unique to this document.

Item	Convention	Meaning
<KEYCAPS>	Pointed brackets around a term	A key on a computer keyboard
[TARGET]	Square brackets around a term	For touch screen monitors, an area that can be touched to invoke a system action
`entry data`	Courier bold text	Data you enter into the system
`screen/program data`	Courier text	Screen or program data

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Application Module X Service Manual
Section 1—Introduction

1.1 About this Document

Basics

Purpose	This manual provides instructions for maintenance and repair of the Application Module$^{X.}$
Intended audience	All personnel that are expected to perform hardware installation, troubleshooting, and repair activities on the Application Module^{X}.
For product release	This publication supports TDC 3000X software release 431 and CE Compliant hardware.

Product description

The Application Module^{X} is an LCN node that combines the Application Module (AM) functionality with an HP-UX-based coprocessor.

CE compliant hardware

Any equipment designated as "CE Compliant" complies with the European Union EMC and Health and Safety Directives. All equipment shipping into European Union countries after January 1, 1996 require this type of compliance—denoted by the "CE Mark".

1.2 References for More Information

The following documentation is referenced from within this document:

Publication Title	Publication Number	Binder Title	Binder Number
Application Module^{X} System Administration	AX11-200 or AX11-400	Application Module^{X}	2094 or 3094
Application Module^{X} Troubleshooting	AX13-200 or AX13-400	Application Module^{X}	2094 or 3094
Application Module^{X} User Guide	AX09-200 or AX09-400	Application Module^{X}	2094 or 3094
Five/Ten-Slot Service	LC13-400	LCN Service	2060-2
Licensing Installation and Administration A^{X}M	LA20-200	Application Module^{X}	2094
Universal Station Service	US13-400	LCN Service-1	2060-1
Universal Station (Ergonomic) Service	US13-420	LCN Service-1	2060-1
Universal Station^{X} Service	US13-410	Universal Station^{X}	2093

Section 2—Application Module^{X} Overview

2.1 A^{X}M Functionality

General introduction

The Application Module^{X} (A^{X}M) provides the functionality of a standard Application Module (AM) coupled with an HP-UX-based coprocessor.

This hardware combination provides the capability for delivering powerful higher level control schemes to the TDC 3000^{X}. It also provides the capability of adapting and utilizing third party control solutions.

Two performance levels of the coprocessor are available. The basic coprocessor operates at 64 MHz and a high performance coprocessor will operate at 100 MHz.

Supports existing AM functionality

The A^{X}M continues to provide the full functionality of the existing Application Modules (AM). This is accomplished by the LCN node processor portion in the A^{X}M.

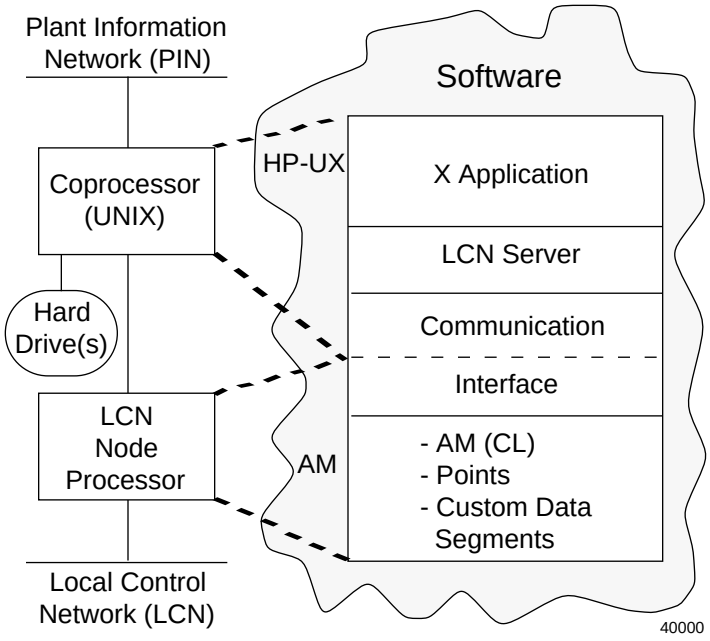
Functionality diagram

The following diagram illustrates that there are two distinct processors in the A^{X}M node. A standard LCN node processor is coupled to an HP-UX-based coprocessor.

The total A^{X}M software responsibility of both processors is identified by the dotted lines.

Notice that both processors must work through their respective portions of the communication software to successfully pass information between them.

X applications will be executed in the coprocessor. Access to LCN point data is done through the LCN node processor. The Control Language (CL) running in the node processor has been modified to include mechanisms for calling and starting solutions resident in the coprocessor.



2.2 Hardware Organization

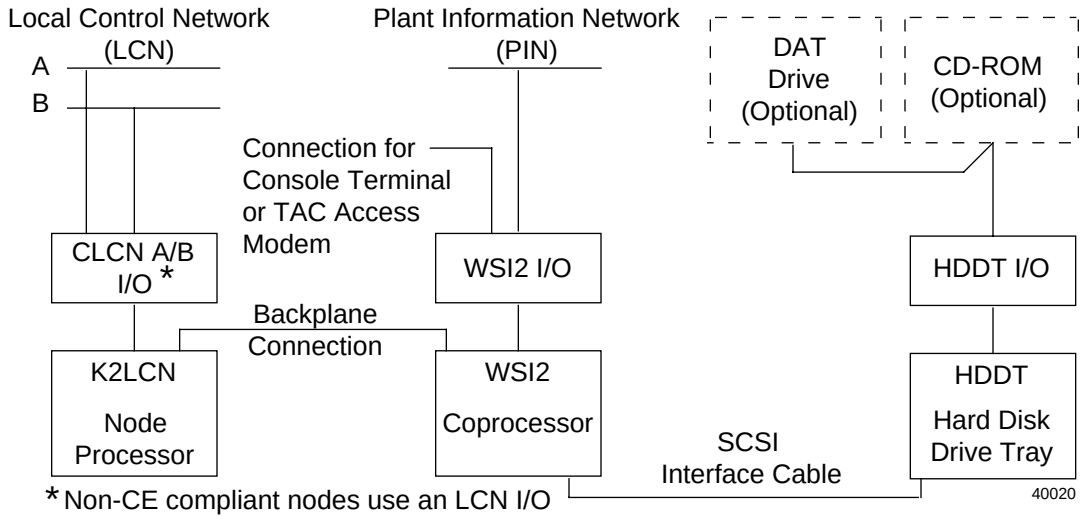
A^{X}M hardware block diagram

Two versions of A^{X}M hardware will be available. One uses the K2LCN board as the LCN node processor and the other uses the HMPU/LLCN/QMEM combination of boards as the LCN node processor.

The diagrams on the following two pages show the major hardware components that make up the A^{X}M hardware. Pay particular attention to the following:

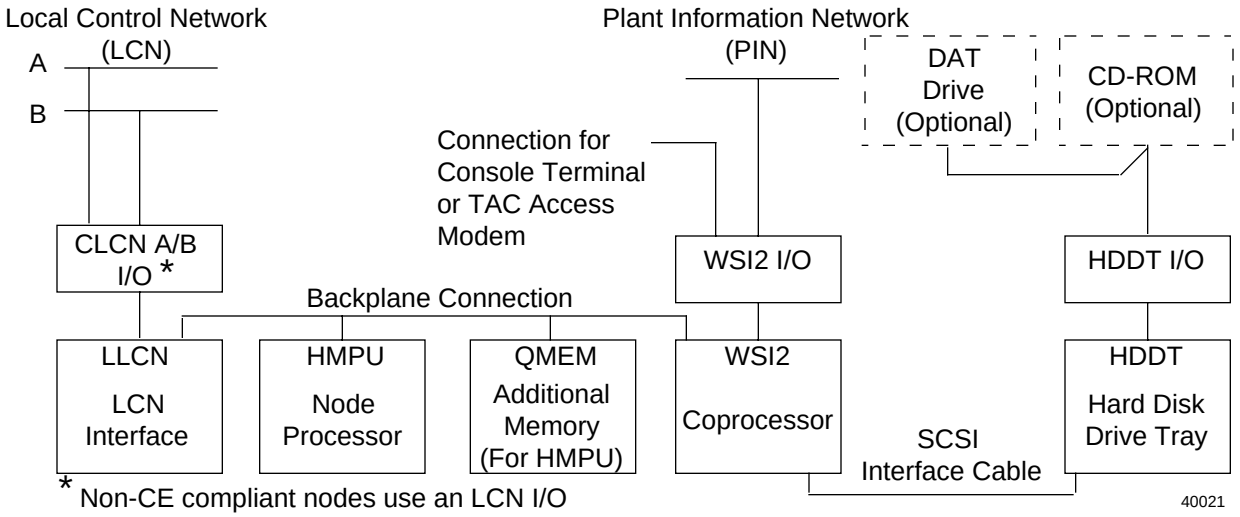
- Names and acronyms of the components
- Interconnection between components
- External connections to:
  - Local Control Network (LCN)
  - Plant Information Network (PIN)
  - "Console terminal" (when required for initial configuration or troubleshooting). A console terminal is a simple keyboard and display device that has no processing capability. Several device types can be used to satisfy this requirement. They are addressed later in this manual.
  - Modem for Technical Assistance Center (TAC) access (if required for complex problem isolation activities).
  - Digital Audio Tape (DAT) drive (optional) to support hard disk backup, restore, and software update activities. It is also used for recovery activities in the event of some hard disk drive failures.
  - CD-ROM (optional) provides access to the HP-UX online software documentation.

K2LCN hardware version



HMPU hardware version

The following diagram illustrates the HMPU version of hardware.



2.3 Board Slot Definition

Overview of chassis types

The A^{X}M will appear in two types of LCN node hardware chassis. They are

- Five-slot chassis (when using a K2LCN node processor)
- Ten-slot chassis (when using an HMPU node processor)—This specific Ten-slot chassis has a split backplane with 6 slots (bottom) dedicated to one LCN node and 4 slots (top) for another LCN node. This Ten-slot chassis has been used in other special LCN applications. A second node in slots 7-10 is not allowed in the case of an A^{X}M.

Five-slot board placement

The following tables show the A^{X}M board placement for the Five-slot chassis using the K2LCN node processor.Two versions of board placement are used depending on the size of the coprocessor memory which is located on the WSI2 board. The 256 megabyte size requires additional space above the WSI2 board.

Table 2-1 5-Slot Chassis Board Locations (32/64/128 MB Coprocessor Memory sizes.)

Slot	Front	Rear
5	Optional Application Board	
4	Hard Disk Drive Tray (occupies two slots)	
3		HDDT I/O
2	WSI2 *	WSI2 I/O
1	K2LCN-4 (or K2LCN-8)	CLCN A/B or LCN I/O **

Table 2-2 5-Slot Chassis Board Locations (With 256 MB Coproc. Mem.)

Slot	Front	Rear
5	Hard Disk Drive Tray (occupies two slots)	
4		HDDT I/O
3	(Space for extra WSI2 memory) WSI2 *	
2		WSI2 I/O
1	K2LCN-4 (or K2LCN-8)	CLCN A/B or LCN I/O **

* Two versions of the WSI2 board are available to provide the 64 MHz and 100 MHz coprocessors.

** Non-CE compliant versions use the LCN I/O

Ten-slot board placement

The following two tables show the AXM board placement for the Ten-slot chassis using the HMPU node processor. Two versions of board placement are used depending on the size of the coprocessor memory which is located on the WSI2 board. The 256 megabyte size requires additional space above the WSI2 board.

Slots 7 through 10 do not share a common backplane for interconnection with slots 1 through 6.

The Hard Drive Disk tray does not depend on the backplane for signal interconnection with other slots. It only uses the slots it occupies to obtain power, which is common to all slots.

Table 2-3 Ten-Slot Chassis Board Locations (with 32/64/128 MB Coprocessor Memory sizes)

Slot	Front	Rear
10	Unusable slot	
9	Unusable slot	
8	Hard Disk Drive Tray (occupies two slots)	
7		HDDT I/O
6	WSI2 *	WSI2 I/O
5	Optional Application board	
4	Optional memory board	
3	QMEM-2	
2	LLCN	CLCN A/B or LCN I/O **
1	HMPU	

* Two versions of the WSI2 board are available to provide the 64 MHz and 100 MHz coprocessors.

** Non-CE compliant versions use the LCN I/O.

Table 2-4 Ten-Slot Chassis Board Locations (with 256 MB Coproc. Mem.)

Slot	Front	Rear
10	Unusable slot	
9	Unusable slot	
8	Hard Disk Drive Tray	
7	(occupies two slots)	HDDT I/O
6	(Space for extra WSI2 memory)	
5	WSI2 *	WSI2 I/O
4	Optional application board	
3	QMEM-2	
2	LLCN	CLCN A/B or LCN I/O **
1	HMPU	

* Two versions of the WSI2 board are available to provide the 64 MHz and 100 MHz coprocessors.

** Non-CE compliant versions use the LCN I/O.

2.4 Power Supply

Introduction

The A^{X}M node contains a power supply (55 amp) that is used in many other LCN node types.

It is capable of producing output voltage margins of +5% and -5% that, in some cases, are used in factory test and troubleshooting activities. This margining is controlled by the jumper on the face of the power supply. See the following diagram.

Similar power supplies are used in both the K2LCN (Five-slot) and HMPU (Ten-slot) versions of A^{X}M.

Node power margin restrictions

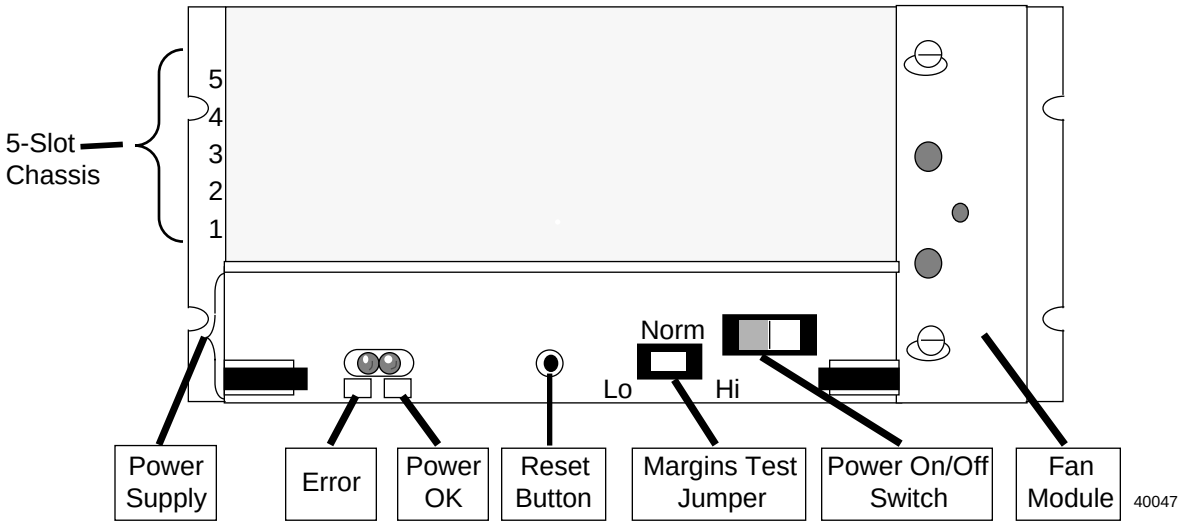
WARNING

The low power margin (-5%) must never be used in the A^{X}M. The coprocessor and hard disk drive design allows for only a -2.5% margin. Using -5% margins will produce unpredictable results.

The high (+5%) power margin can be used by factory test and during troubleshooting activities. Honeywell does not recommend using any power margins while a node is on process.

Node power supply diagram

The following diagram shows the power supply in a Five-slot chassis (K2LCN version). A similar power supply is used in the Ten-slot chassis (HMPU version).



Section 3—Hardware Description of LCN Node Processors

3.1 K2LCN-X Node Processor

Overview

The K2LCN processor board contains all of the essential parts to make up the kernel portion of any LCN node. It includes a 68020 processor, LCN interface circuits, and 4-8 megawords of onboard memory (for A^{X}M). It does not have floating point calculation hardware capability. The exact memory size is determined by which option is purchased. A minimum of 4 Megawords are required to support R431.

Changing memory size requires the replacement of the current K2LCN board with a board containing the proper memory complement. This board cannot be upgraded in the field.

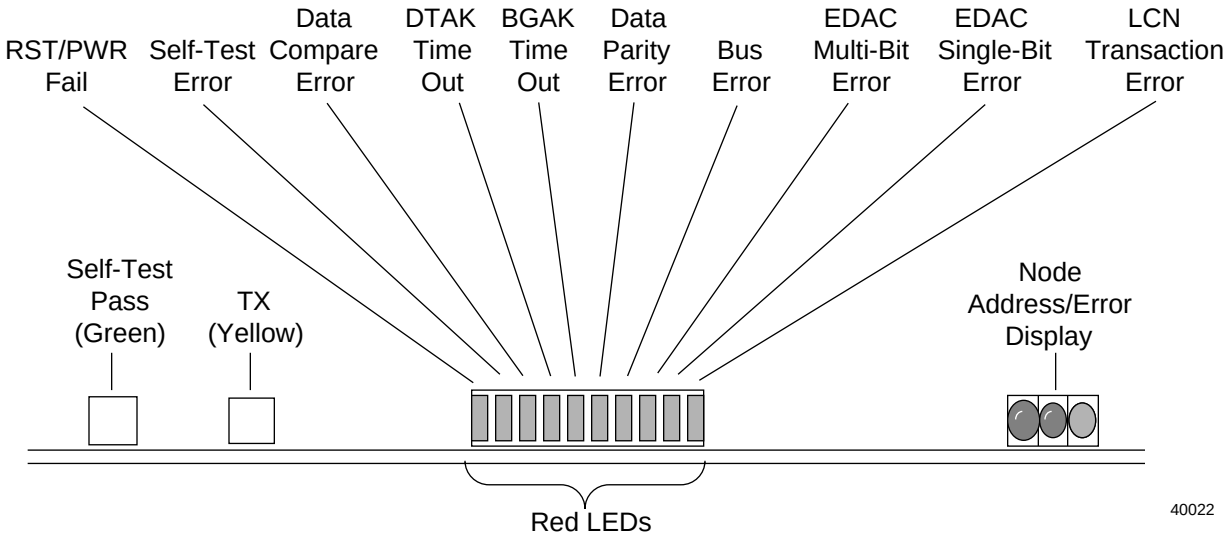
The K2LCN board memory size is easily recognized by the -X portion of the name on the left extraction lever; i.e., K2LCN-4 = 4 megawords, K2LCN-8 = 8 megawords, etc.

K2LCN indicators

The K2LCN board indicators are visible from the free edge of the board while it is installed in a chassis. They provide visual indications regarding the existing conditions on the board.

An indicator diagram follows.

The K2LCN indicators are shown in the diagram.



Indicator description

The following table gives a description of the indicators on the K2LCN board. Reference the preceding diagram.

Table 3-1 K2LCN Board Indicators

LED	Description	Suspected cause if abnormal
Self-Test Pass	On after board passes self-test. Normally on.	K2LCN
TX	On when transmitting on the LCN. Normally on or flashing rapidly.	K2LCN
RST/PWR fail	On when a reset operation caused by the reset button or power on is in progress. Normally off.	K2LCN
Self-Test Error	On to indicate a board self-test error. Normally off.	K2LCN
Data Compare Error	On to indicate an on-board data compare error. Normally off.	K2LCN
DTAK Time Out	On to indicate a Data Transfer Acknowledge failure. Normally off.	K2LCN
BGAK Time Out	On to indicate a Bus Grant Acknowledge failure. Normally off.	K2LCN or other board(s) in chassis
Data Parity Error	On to indicate an on-board data parity error. Normally off.	K2LCN
Bus Error	On to indicate a detected backplane bus parity error. Normally off.	K2LCN, other board(s) in chassis, or backplane
EDAC Single-Bit Error	On to indicate a single-bit (correctable) RAM error. Normally off.	K2LCN
EDAC Multiple-Bit Error	On to indicate a multiple-bit (uncorrectable) RAM error. Normally off.	K2LCN
LCN Transaction Error	On to indicate communication problems with the LCN. Normally off.	K2LCN or CLCN A/B I/O (LCN I/O) or LCN network
Node Address/Error display	This 3-digit display normally displays the pinned LCN node address. It will display error codes for further problem definition in error situations.	See Five-Slot Service Manual for multiple possible causes. Reference >>Alpha Numeric Displays in Appendix A.

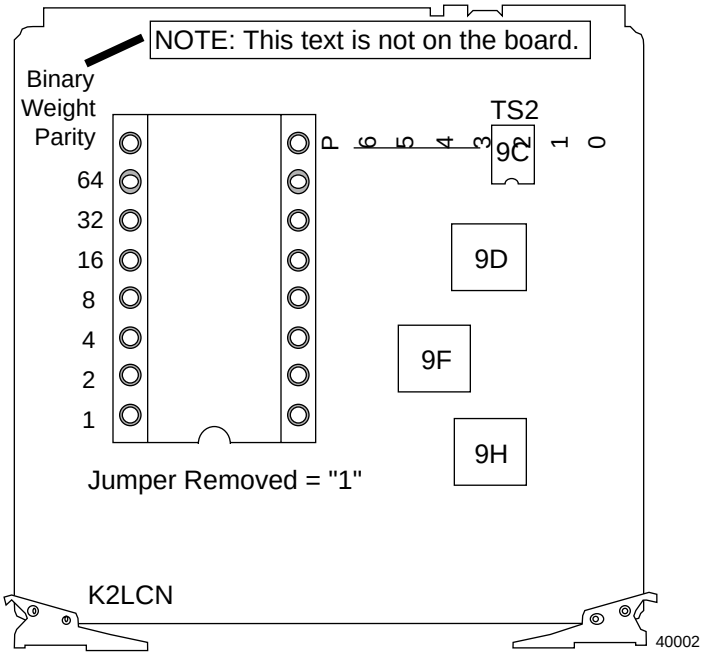
K2LCN pinning

The K2LCN has an LCN node number pinning feature on the board itself. This feature is duplicated on the CLCN A/B I/O (or LCN I/O) board which is installed directly behind the K2LCN board in the AXM Five-slot chassis.

ATTENTION

The address pinning jumpers must all be removed from the K2LCN board when it is used in conjunction with an LCN I/O board. The node number pinning must be done on the LCN I/O board in this case.

The K2LCN pinning requirement for the AXM is shown at the right. Notice there are no jumpers.



3.2 HMPU Processor and Associated Boards

Overview

The HMPU node processor has a 68020 microprocessor and includes floating point calculation hardware capability. It also has 2 megawords of on-board memory.

Additional memory for the HMPU processor in the A^{X}M node is provided by a QMEM board.

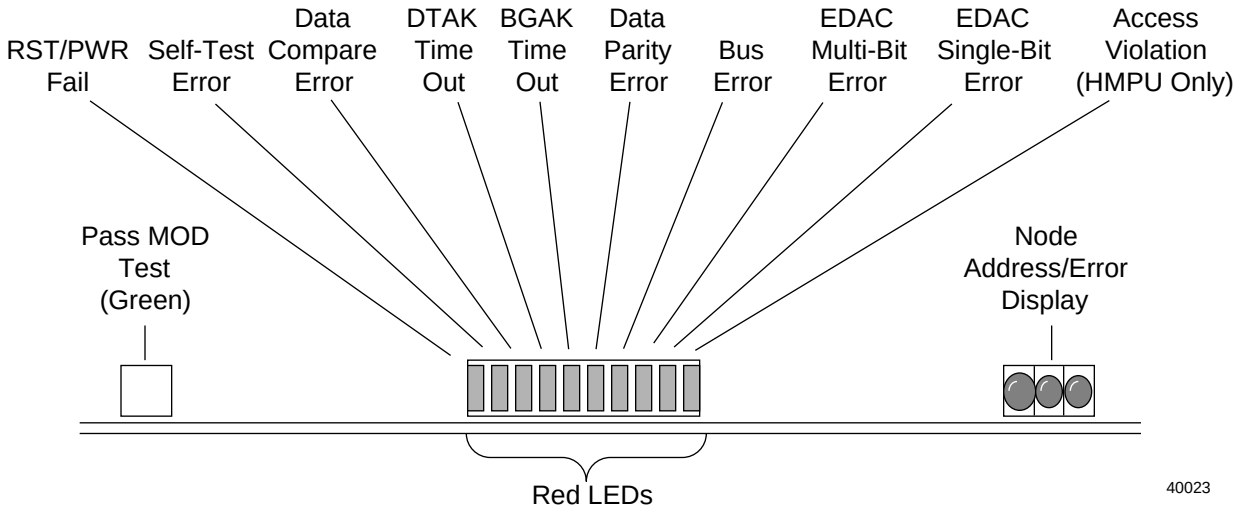
The HMPU board does not have LCN interface circuits and consequently must always have an LLCN board as its partner to form the kernel for the A^{X}M LCN node.

HMPU indicators

The HMPU board indicators are visible from the free edge of the board while it is installed in a chassis. They provide visual indications regarding the existing conditions on the board.

An indicator diagram follows:

The HMPU indicators are illustrated in the following diagram:



Indicator description

The following table gives a description of the indicators on the HMPU board. Reference the preceding diagram.

Table 3-2 HMPU Error Indicators

LED	Description	Suspected cause if abnormal
Pass Module Test	On after board passes self-test. Normally on.	HMPU
RST/PWR Fail	On when a reset operation caused by the reset button or power on is in progress. Normally off.	HMPU

Table 3-2 HMPU Error Indicators (continued)

LED	Description	Suspected cause if abnormal
Self-Test Error	On to indicate a board self-test error. Normally off.	HMPU
Data Compare Error	On to indicate an on-board data compare error. Normally off.	HMPU
DTAK Time Out	On to indicate a Data Transfer Acknowledge failure. Normally off.	HMPU
BGAK Time Out	On to indicate a Bus Grant Acknowledge failure. Normally off.	HMPU or other board(s) in chassis
Data Parity Error	On to indicate an on-board data parity error. Normally off.	HMPU
Bus Error	On to indicate a detected backplane bus parity error. Normally off.	HMPU, other board(s) in chassis, or backplane
EDAC Single-Bit Error	On to indicate a single-bit (correctable) RAM error. Normally off.	HMPU
EDAC Multiple-Bit Error	On to indicate a multiple-bit (uncorrectable) RAM error. Normally off.	HMPU
Access Violation	On to indicate a memory access violation. Normally off. (Frequently on with Bus error or EDAC Multiple bit error indicators.)	HMPU or another board in the chassis.
Node Address/Error display	This 3-digit display normally displays the pinned LCN node address. It will display error codes for further problem definition in error situations.	See Five/Ten-Slot Service Manual for multiple possible causes.

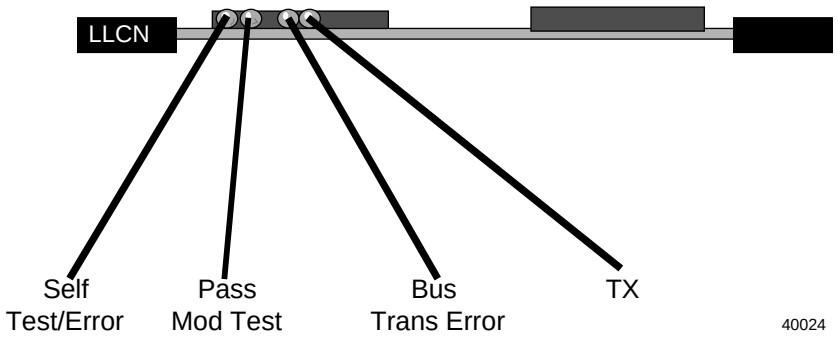
LLCN board functionality

The LLCN board provides the LCN interface functionality used by the HMPU node processor. The actual connection to the LCN cables is through the CLCN A/B I/O (or LCN I/O) board which is inserted in the I/O card chassis immediately behind the LLCN board (same board slot).

The LCN node address is pinned on the CLCN A/B I/O (or LCN I/O) board and is covered later in this section.

LLCN board indicators

The LLCN board indicators are visible from the free edge of the board when it is installed in a chassis. They provide visual indications regarding the existing conditions on the board.



LLCN indicator description

The following table gives a description of the indicators on the LLCN board. Reference the preceding diagram.

Table 3-3 LLCN Indicators

LED	Description	Suspected cause if abnormal
Self-Test/Error	On to indicate a board self-test error. Normally off.	LLCN
Pass module test	On after board passes self-test. Normally on.	LLCN
Bus Trans Error	On to indicate a detected backplane bus parity error. Normally off.	LLCN, other board(s) in chassis, or backplane
Tx	Transmission on LCN from this board is taking place. Normally on or blinking rapidly (on a loaded node).	LLCN, HMPU, or LCN cable problems.

QMEM-X board

This board is used to provide additional memory for the HMPU node processor. The 2 megaword version is supplied in the A^{X}M. The memory size of any QMEM can quickly be determined by looking at the last digit of the name on the left board extraction lever.

Example:

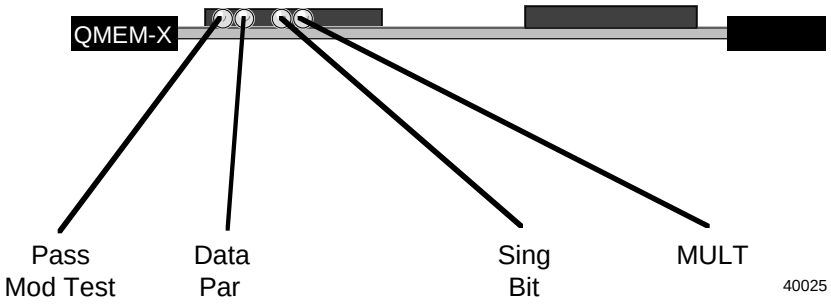
Table 3-4 QMEM Memory Capacities

Board name	Memory capacity
QMEM-2	2 Megawords
QMEM-3	3 Megawords
QMEM-4	4 Megawords

A minimum of 4 megawords of node processor memory is required to support R431
(HMPU=2 + QMEM-2=2).

QMEM indicators

The QMEM board indicators are visible from the free edge of the board while it is installed in a chassis. They provide visual indications regarding the existing conditions on the board.



QMEM indicator description

The following table gives a description of the QMEM indicators. Reference the preceding diagram.

Table 3-5 QMEM Indicator

LED	Description	Suspected cause if abnormal
Data Par	Parity error detected on incoming data from the backplane module bus. Normally off.	Another board in node, backplane, or QMEM
Pass Mod test	On after board passes self-test. Normally on.	QMEM

Table 3-5 QMEM Indicator (continued)

LED	Description	Suspected cause if abnormal
Sing Bit	On to indicate a single bit (recoverable) error exists. Normally off.	QMEM
Mult	On to indicate a multiple bit (unrecoverable) error exists. Normally off.	QMEM.

3.3 CLCN A/B I/O (or LCN I/O) Board

Overview

This board provides the physical interface to the LCN cables. It is used with both versions of node processors (K2LCN and HMPU).

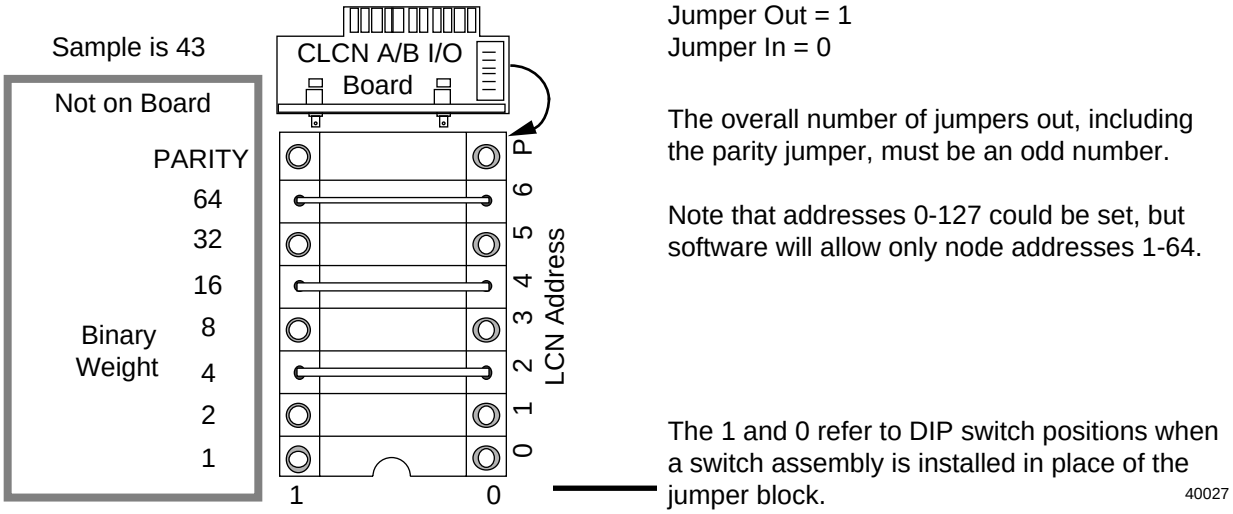
LCN address pinning

The A^{X}M LCN address pinning feature for defining the LCN physical node number is located on this board. These address jumpers must be properly configured at the time of hardware installation.

See the Five/Ten-Slot service manual for additional pinning details.

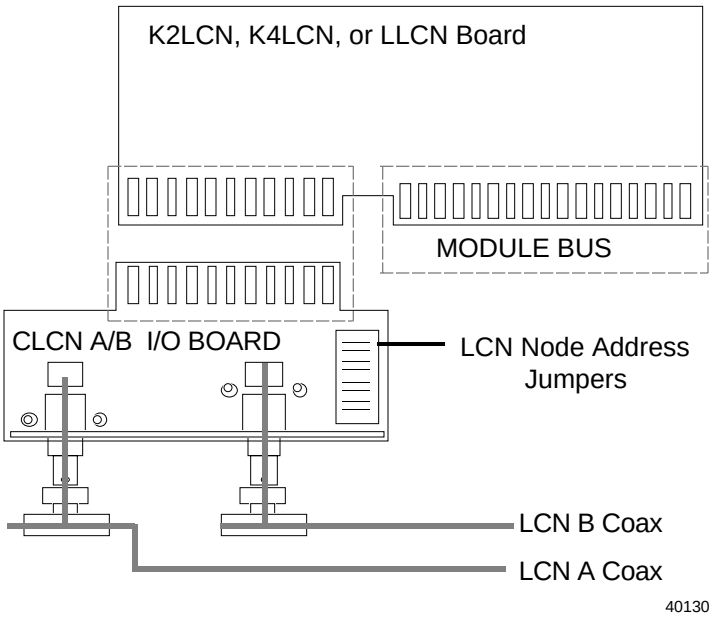
> CAUTION
>
> **Conflict in pinning possible—**The K2LCN processor board has a duplicate LCN node pinning feature. The address jumpers on the K2LCN must all be removed when it is used in conjunction with an CLCN A/B I/O (or LCN I/O) board.

The LCN node address pinning is illustrated in the diagram below.



LCN cable connections

The A^{X}M node processor is connected to the LCN cable network. These LCN cables (A and B) are connected to the CLCN A/B I/O (or LCN I/O) board as shown in the following diagram. This cabling scheme is the same for each LCN node that uses the CLCN A/B I/O (or LCN I/O) board.



3.4 Node Processor Related Board Replacement

Overview

Node power must be turned off for the purpose of changing circuit boards in the AXM node.

> WARNING
>
> **Damage can result—**Circuit board damage can result if you do not practice proper ESD procedures or attempt to remove/insert a circuit board with node power applied.

> CAUTION
>
> **Mandatory steps—**It is mandatory that appropriate software shutdown procedures are followed for the AXM coprocessor prior to removing power from the node.
>
> Failure to do so can cause damage to the HP-UX file structure on the coprocessor hard disk.

> **ATTENTION**
>
> It is also highly recommended that you perform a node processor software shutdown when preparing to power off the AXM node. This provides for an orderly departure from the LCN network.

Locating shutdown procedure

Software shutdown procedures for the AXM coprocessor are documented in Section 3 of the Application ModuleX System Administration manual.

Board removal/ replacement procedure

Table 3-6 Board Replacement Procedure

Step	Action
1	Turn off power using the switch on the node power supply.
2	Remove the board.
3	Verify that the replacement board pinning matches the existing board.
4	Insert the replacement board.
5	The node is now ready for power on and loading.
6	Perform the node loading procedure. Reference >>*A^{X}M System Administration manua*l (Section 3)

Section 4—Hardware Description of Coprocessor

4.1 WSI2 Board Description

Overview

The basic WSI2 board contains the coprocessor interface circuits required to adapt the coprocessor into the A^{X}M node hardware. Reference the diagram below.

A coprocessor daughter board connects to the WSI2 mother board through a specially provided connector on the WSI2 board. Several small cables are also used to complete the total coprocessor to WSI2 board connections.

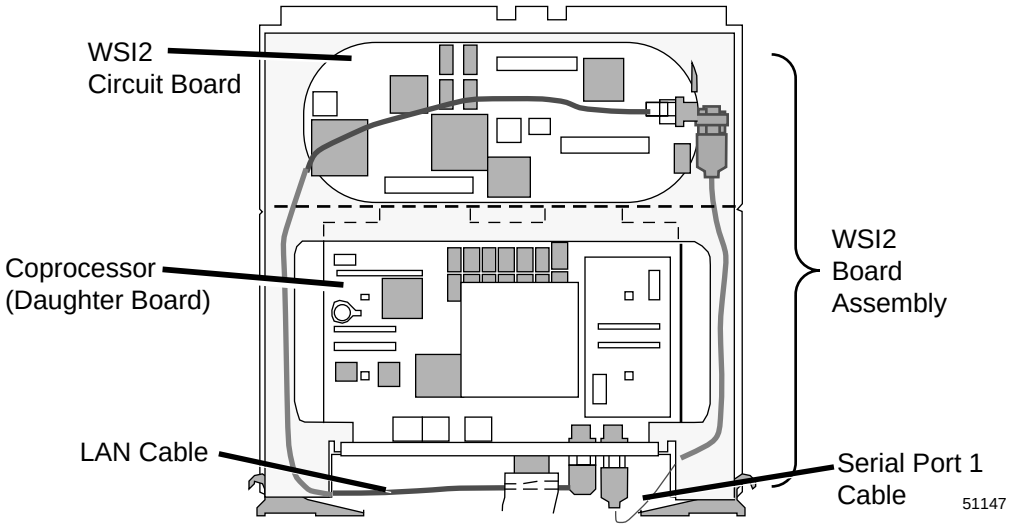
The WSI2 board is normally referred to as a board assembly which includes the coprocessor daughter board (with its associated memory) and all on board cables.

Neither coprocessor (daughter board) nor the WSI2 (mother board) is separately field replaceable. The complete WSI2 assembly will be available as a single spare part.

The coprocessor memory (mounted on the coprocessor daughter board) is ordered separately. The spare parts section of this manual supports this ordering concept. (Section 11, Table 11-4).

WSI2 board illustration

The diagram below illustrates how the WSI2 board assembly is organized.



WSI2 board indicators (LEDs) and switch

The diagram below shows two indicators and a switch at the left. These are the WSI2 board indicators. These indicators are directly visible with the chassis front cover in place. The indicators are described as follows:

- Transaction error (red LED)

  Indicates that a data parity error or bus error was encountered during normal operation on the backplane module bus.

- WSCPU running (yellow LED)

  When on indicates that the coprocessor software (HP-UX) is up and running.

- Shutdown Switch

  The switch can be used to force a coprocessor (HP-UX) shutdown. It is recommended that the keyboard method (as documented in the *AXM System Administration* manual) be used whenever possible.

  The positions of this switch are defined as follows:

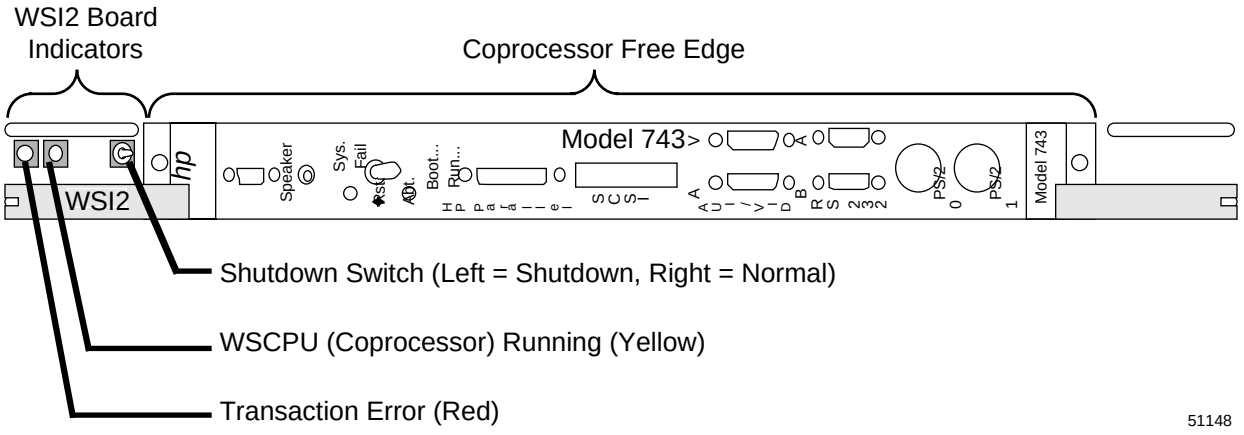
  To the left = Shutdown

  To the right = Normal

- The remainder of the diagram shows the connectors and indicators on the coprocessor daughter board free edge. They are defined in a later diagram.

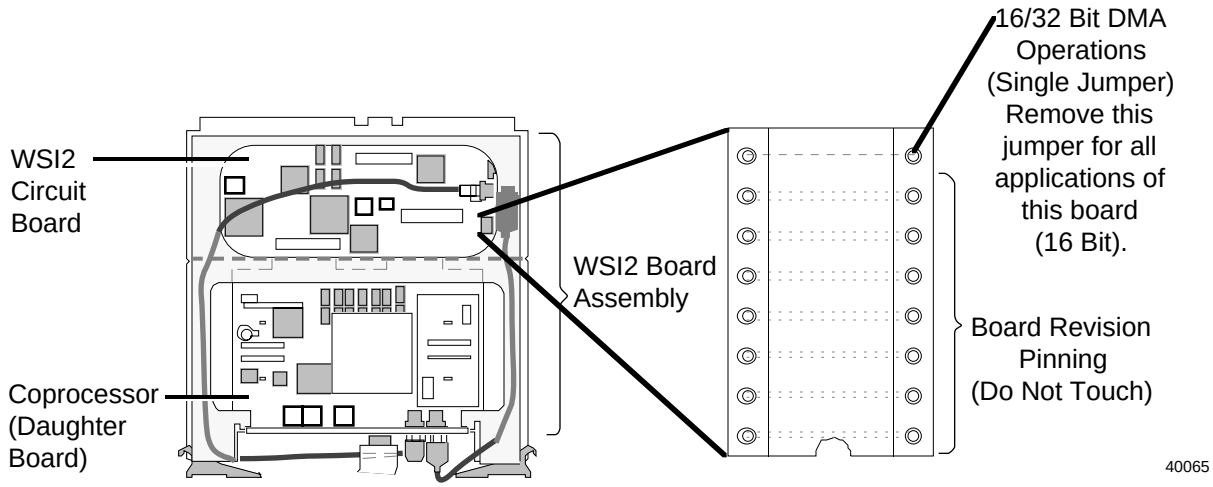
WSI2 board indicators

The diagram below describes the indicators on the WSI2 mother board. The coprocessor daughter board portion is covered later in this section.



WSI2 board pinning

The WSI2 board has only one pinned option. The pinning defines if an HMPU board or a K2LCN board is used as the node processor. The interface to these two node processors is somewhat different.


16/32 Bit DMA Operations (Single Jumper) Remove this jumper for all applications of this board (16 Bit).
WSI2 Circuit Board
WSI2 Board Assembly
Board Revision Pinning (Do Not Touch)
Coprocessor (Daughter Board)
40065

Calender clock battery

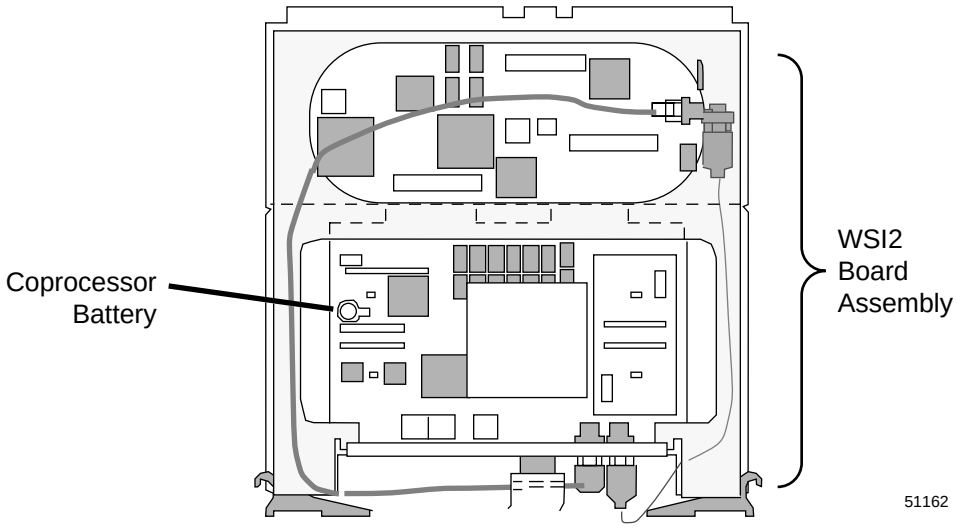
The coprocessor contains a time of day clock circuit which has a battery backup. The clock circuits are maintained by this battery whenever node power is removed.

This battery has a very long life (years), but it will eventually have to be replaced.

Note the location of this battery on the coprocessor daughter board shown in the diagram below. It is a separately listed item in the parts list.

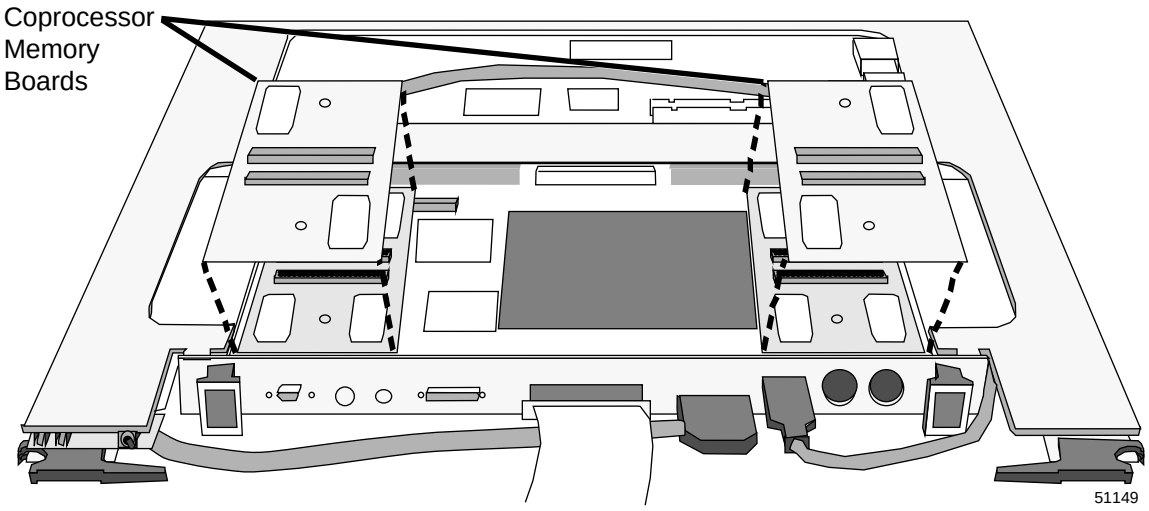
Coprocessor battery location

The following diagram illustrates the location of the coprocessor battery. It may not be as clearly visible as shown here because an additional memory board may be installed on your coprocessor. The battery will be covered by the additional memory board, if it exists.



Coprocessor memory

The coprocessor, which plugs into the WSI2 board, itself can have one or more daughter boards. These are the coprocessor memory boards. The diagram below illustrates the position of these boards. The coprocessor memory can be upgraded in the field by changing these boards.

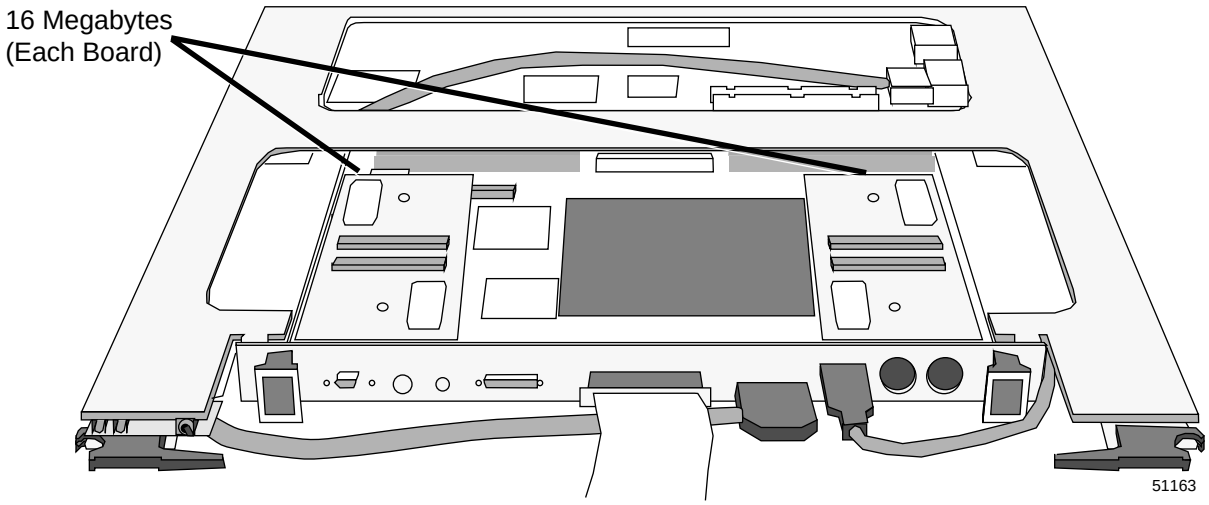


The coprocessor memory daughter boards are mounted with two Phillips screws threaded into standoffs on the coprocessor board. These screws and associated washers must be removed to change the memory boards.

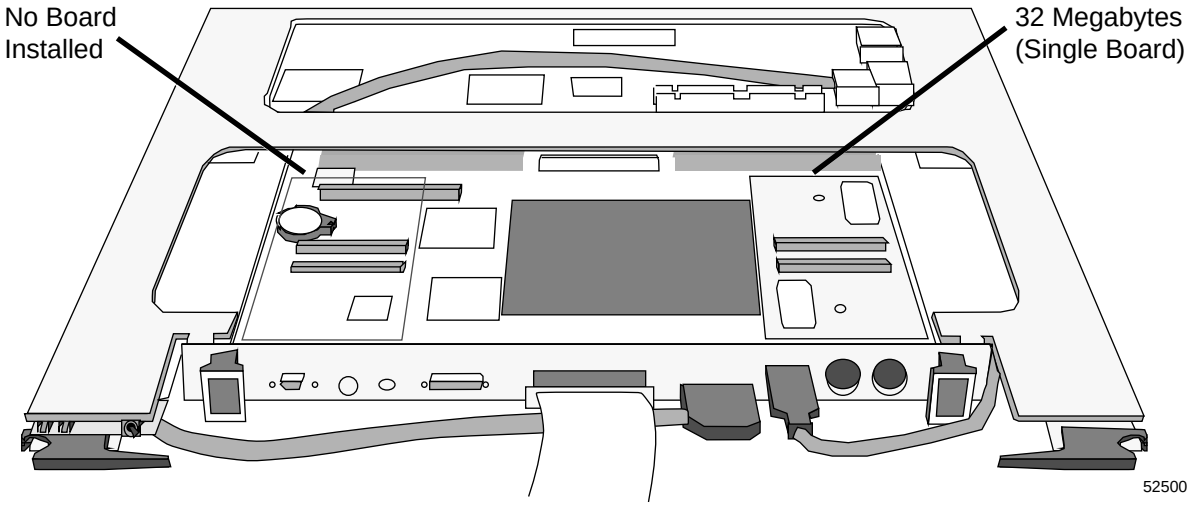
Exercise care when pushing on the replacement memory board to ensure proper mating of the pins and sockets in the connectors.

Coprocessor memory option (32 megabytes)

The following two illustrations show the two methods of providing the minimum 32 megabyte memory option in position on the coprocessor board. Memory board availability at the time of manufacture will determine which method is used.The first method consists of two 16 megabyte boards.

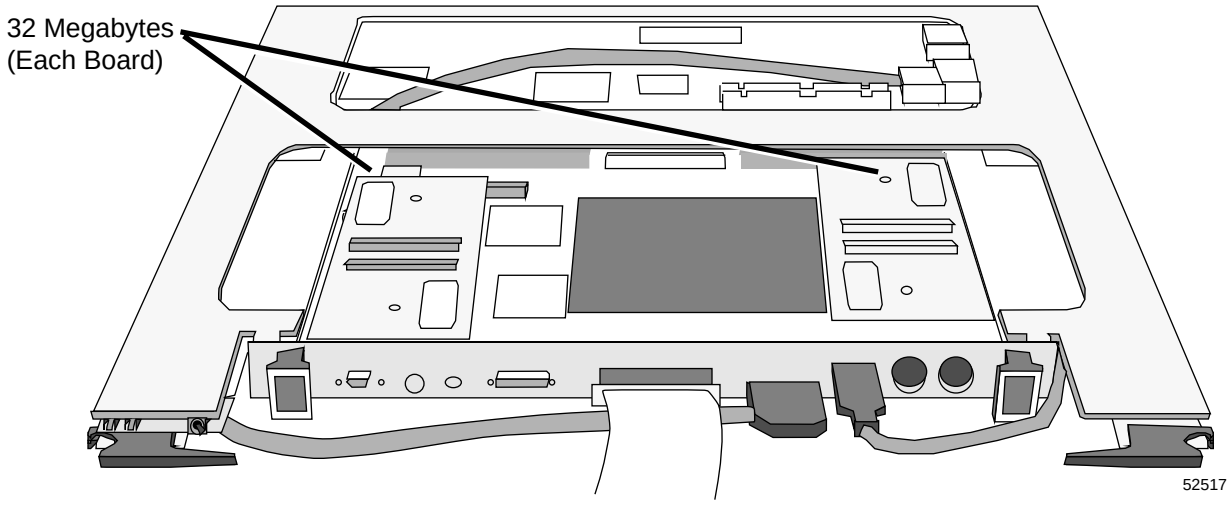


The illustration below shows the second method of providing the 32 megabyte memory option. It consists of only one 32 megabyte memory board.

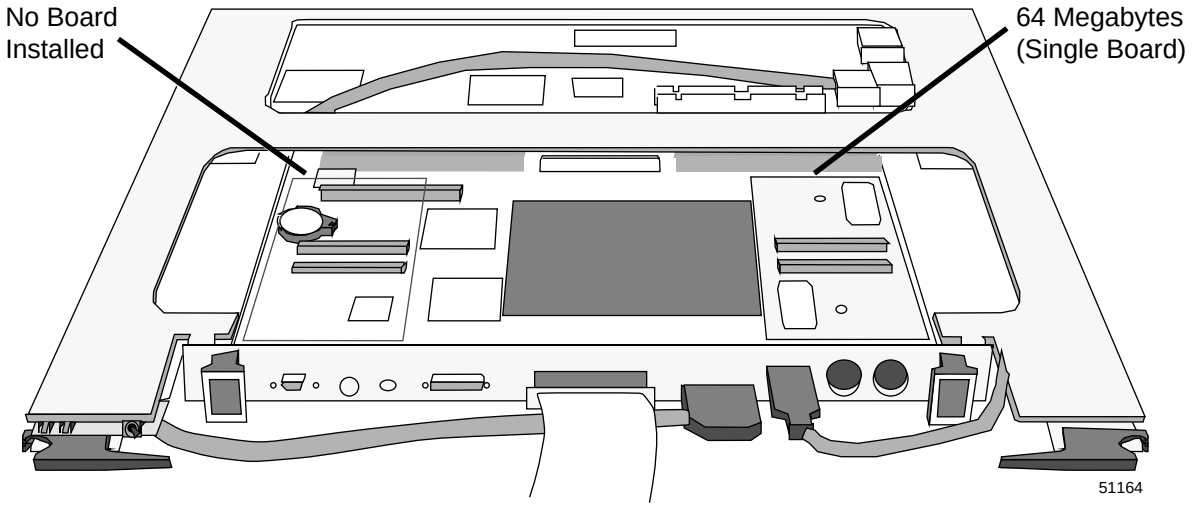


Coprocessor memory option (64 megabytes)

The following two illustrations show the two methods of providing the 64 megabyte memory option in position on the coprocessor board. Memory board availability at the time of manufacture will determine which method is used.The first method consists of two 32 megabyte boards.

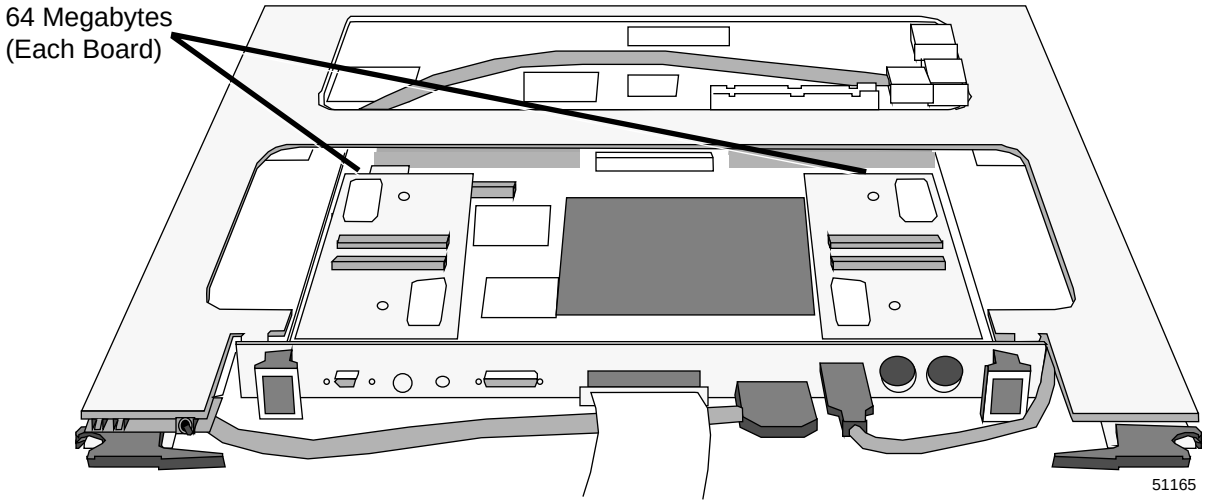


The illustration below shows the second method of providing the 64 megabyte memory option. It consists of only one 64 megabyte memory board.



Coprocessor memory option (128 megabyte)

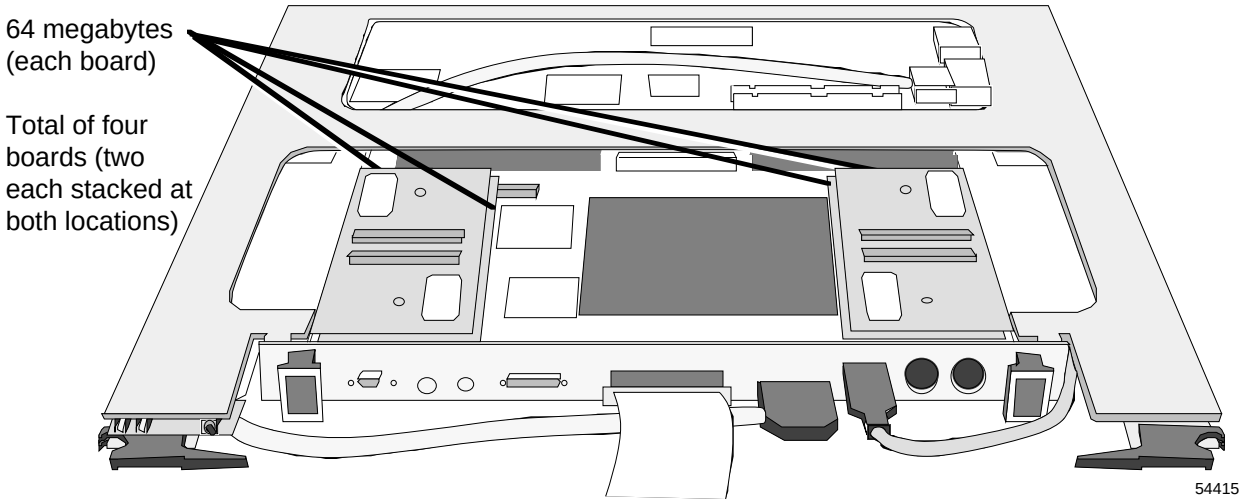
The illustration below shows the 128 megabyte memory option in position on the coprocessor board.


64 Megabytes
(Each Board)
51165

Coprocessor memory option (265 megabyte)

The illustration below shows the 256 megabyte memory option in position on the coprocessor board. Notice that there are two 64 megabyte memory daughter boards stacked in two locations. The 64 megaword memory daughter boards (4 each) make up 256 megabytes of total memory.

The stacking of these memory daughter boards requires additional clearance on the top side of the WSI2 board. The 256 megabyte version of board placement must be used (described in Section 2 of this document). The card slot above the WSI2 must remain empty to provide the required space.



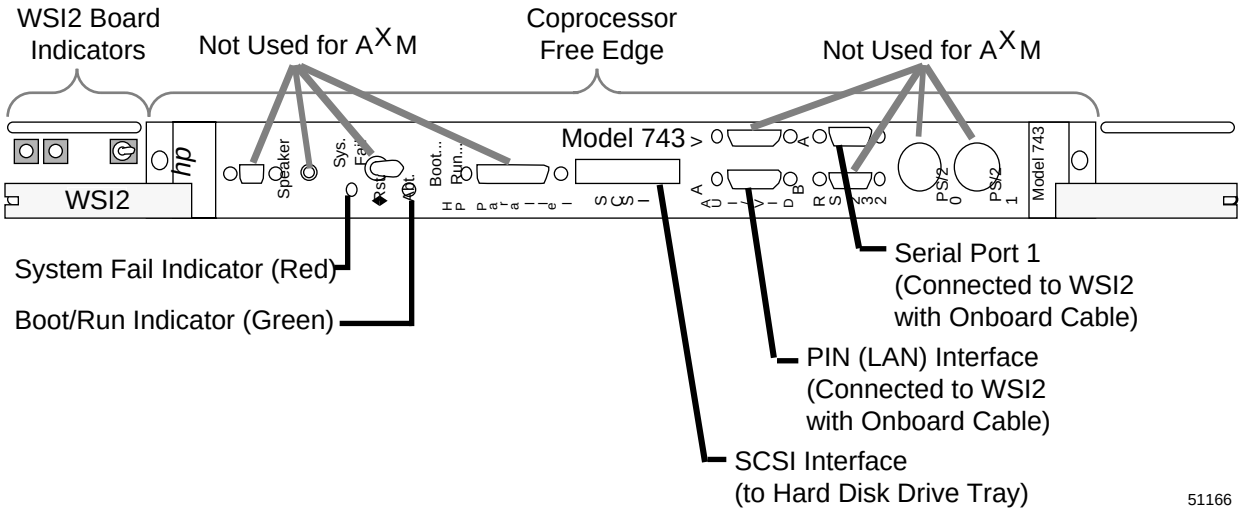
Coprocessor free edge

The illustration below shows several items. Some of these are not used in the AXM application and are identified as such. The following describes the ones that are used.

- Sys Fail—(Red indicator) Comes on at power on and turns off after internal test routines complete successfully.
- Boot/Run—(Green indicator) Blinks during the boot process and turns on (steady) when the boot is completed.
- SCSI—It is the interface used for connecting the coprocessor SCSI (disk drive) interface to the disk drive tray through a cable.
- AUI/VID-A—Provides the interface to the Plant Information Network (PIN). The PIN is Honeywell's terminology for the Local Area Network (LAN).
- RS-232-A—Commonly referred to as Serial Port 1. It provides the interface for the coprocessor console (terminal) or TAC access modem.

Coprocessor free edge illustration

The diagram illustrates the coprocessor free edge and identifies the components that apply to the AXM application of this board.

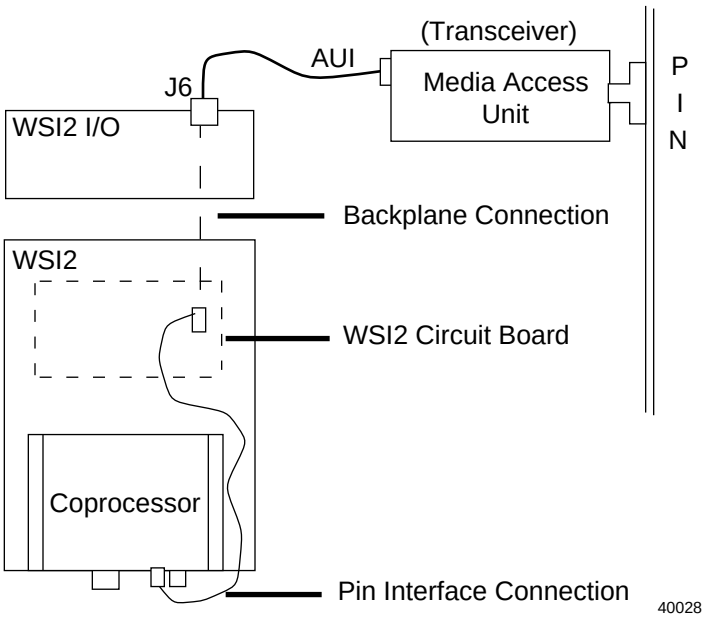

WSI2 Board Indicators
Not Used for AXM
Coprocessor Free Edge
Not Used for AXM
Model 743 >
WSI2
Model 743
System Fail Indicator (Red)
Boot/Run Indicator (Green)
Serial Port 1 (Connected to WSI2 with Onboard Cable)
PIN (LAN) Interface (Connected to WSI2 with Onboard Cable)
SCSI Interface (to Hard Disk Drive Tray)
51166

Coprocessor PIN connection details

The coprocessor is connected to the PIN network as shown in the diagram.

The PIN connection is made at the coprocessor free edge. The PIN connection is routed from this point:

- Through a cable to the WSI2 mother board,
- Through the mother board, chassis backplane, and on to the WSI2 I/O board,
- To a cable connector on the WSI2 I/O board,
- Through a cable to the Media Access Unit (MAU),
- And the MAU connects to the PIN network.

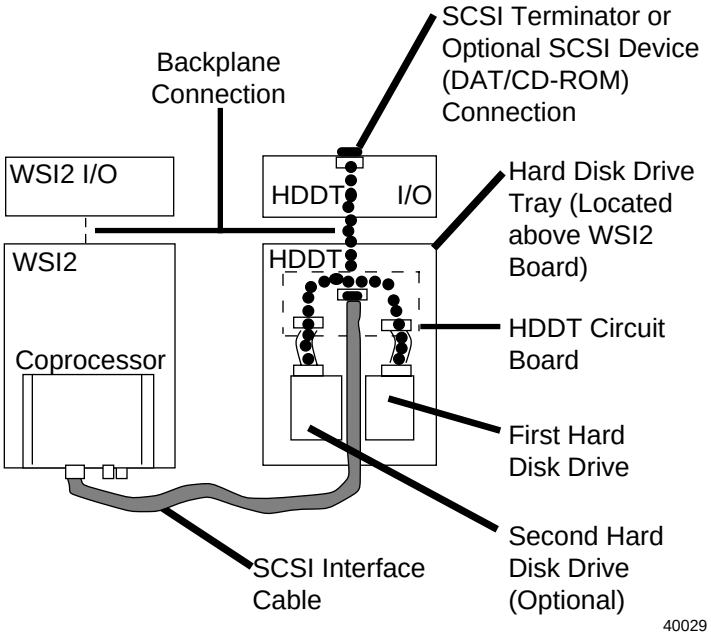


Coprocessor SCSI interface details

The coprocessor SCSI (hard disk drive) interface connection is made at the coprocessor board free edge. From there it is routed:

- Through a cable to the Hard Disk Drive tray (HDDT) internal circuit board,
- Through the internal HDDT circuit board to disk drive interface cables and also through the backplane to the HDDT I/O board,
- Through the HDDT I/O board to a cable connector.

The SCSI interface connector on the HDDT I/O board has a terminator assembly installed if no optional DAT drive or optional CD-ROM is connected. If one or both of the optional devices is connected, the device at the end of the cable must be pinned to provide the bus termination.



Coprocessor hardware identification number

Each coprocessor has a unique software visible hardware identification number manufactured into the board. This hardware identification number is tied directly to the user of the optional Honeywell Kinet software license. Only users requiring DECnet communications support will have Kinet software installed on the coprocessor system.

The Honeywell license key information (correlated to the coprocessor hardware identification number) is obtained from Honeywell prior to system installation. The customer creates a license file based on this information. This activity is not required for A^{X}M R110.

Honeywell provides the appropriate Kinet license key (correlated to the coprocessor hardware identification number) to the customer with the Kinet software at the time of shipment. The customer must enter this provided license key into the Kinet software configuration data.

Replacement of a WSI2 board assembly due to failure (or any other reason) also changes the hardware identification number. This makes the existing Honeywell license key (originally provided) unusable and a new Honeywell license key must be obtained when the WSI2 board is changed.

The procedure for incorporating a new Honeywell license key is provided in the *Licensing Installation and Administration A^{X}M* manual. Reference >> *Licensing Installation and Administration A^{X}M* manual, Section 3.5

The replacement Kinet license key is obtained in the following manner.

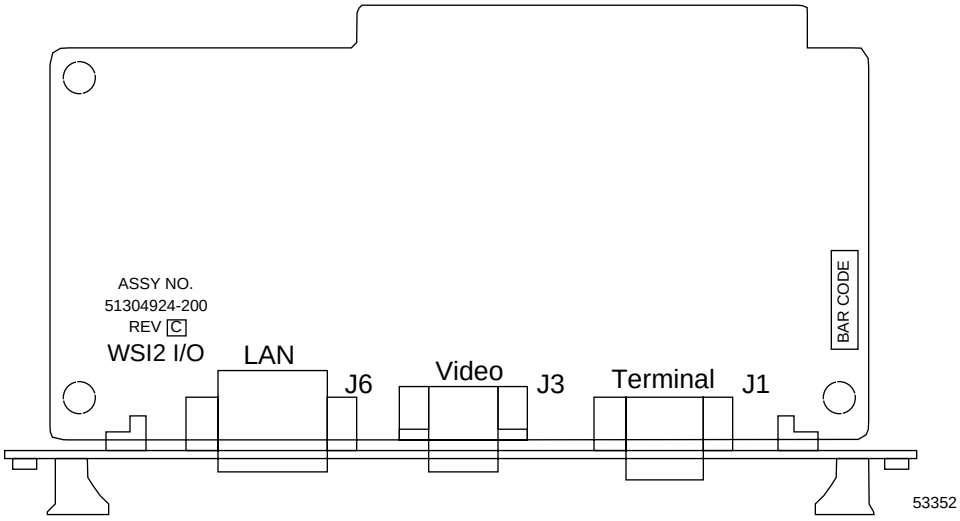
Table 4-1 Procedure to Obtain a Replacement Kinet License key.

Step	Action
1	Install the new WSI2 board assembly as outlined in the replacement procedure provided later in this section.
2	Power on the node and allow the coprocessor to complete its software boot.
3	Sign on as a user. This can be accomplished from any HP-UX compatible device on the PIN (Workstation or U^{X}S) or the coprocessor console (terminal).
4	Enter the command “/etc/lanscan”. The last 12 characters after “0x” under Station Address is the new coprocessor hardware identification number.
5	Having obtained the new hardware identification number, call the Honeywell Technical Assistance Center (TAC) using telephone number 800-822-7673. Inform them that you have changed your Application Module^{X} coprocessor hardware and give them the new hardware identification number.
6	Honeywell will in turn, provide a new Kinet license key which must be entered into the Kinet software configuration data of your system. Reference >>*A^{X}M System Administration* manual, Installing and Updating Software (Section 5).

4.2 WSI2 I/O Board Description

WSI2 I/O board cable connections

The WSI2 I/O board provides the coprocessor connection to the PIN network. A connection for Serial Port 1 (coprocessor console or modem connection to J1) is also provided.



4.3 Media Access Unit (MAU) Description

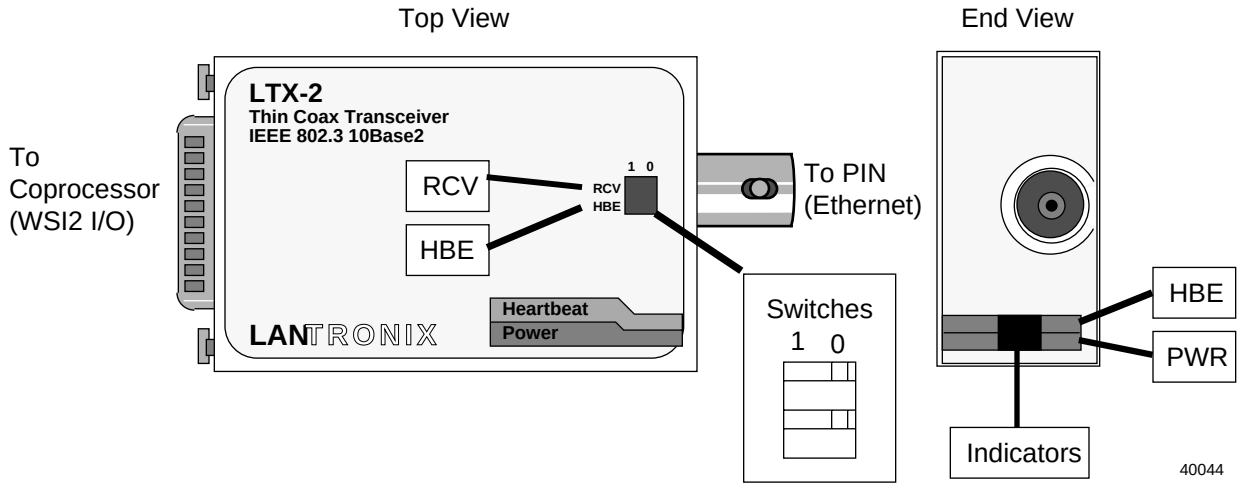
Purpose

The Media Access Unit is the device that connects the A^{X}M to the Plant Information Network (PIN). It contains a transceiver device that adapts the LAN interface of the coprocessor to the LAN (ethernet) cable.

There are many vendors that produce this type of device. The one shown in the diagram is just one of the many available.

Media Access Unit diagram

The following drawing illustrates one of the many types of MAU.



Media Access Unit indicators

Many of the MAU devices have indicators on them. The following indicator and switch explanation is specifically for the MAU shown in the previous diagram.

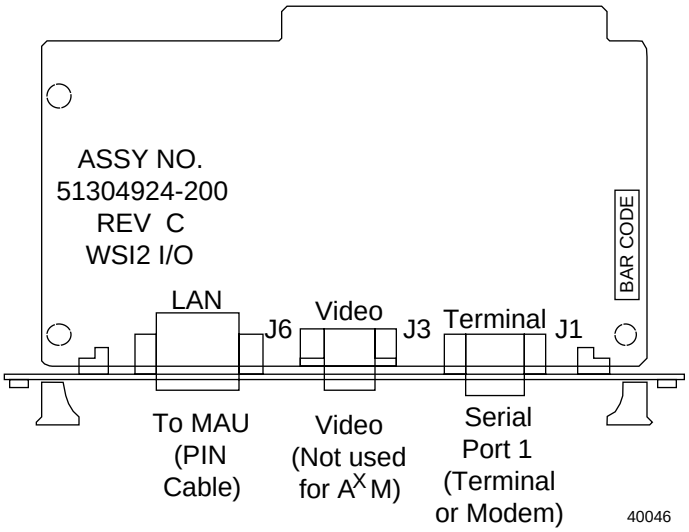
Table 4-2 LTX-2 Indicators and Switches

LED	Description	
PWR (green)	"On" to indicate +12 volt power is applied from the WSI board through the WS2 I/O board and interface cable. Normally "on."	
HBE (AMBER)	This feature (heartbeat) is not used with the Application Module^{X} coprocessor. Normally "off."	
Switch	**Position Required**	**Comment**
RCV	0	(Feature not used)
HBE	0	(Feature not used)

Media Access Unit connection

The following WSI2 I/O diagram identifies the MAU connection (J6).

Power is supplied to the MAU from the WSI2 I/O board through the interface cable.



4.4 WSI2 Board Replacement

Overview

Node power must be turned off for the purpose of changing circuit boards in the AXM node.

> **WARNING**
>
> **Damage Can Result—**Circuit board damage can result if you do not practice proper ESD procedures or attempt to remove/insert a circuit board with node power applied.

> **CAUTION**
>
> **Mandatory Steps—**It is mandatory that appropriate software shutdown procedures are followed for the AXM coprocessor prior to removing power from the AXM node.
>
> Failure to do so can cause damage to the HP-UX file structure on the coprocessor hard disk.

> **ATTENTION**
>
> It is also highly recommended that you perform a node processor software shutdown when preparing to power off the AXM node. This provides for an orderly departure from the LCN network.

Locating shutdown procedure

Software shutdown procedures for both the AXM coprocessor and node processor are documented in the Application ModuleX System Administration manual.

WSI2 Board Replacement Procedure

Table 4-3 WSI2 Board Replacement Procedure

Step	Action
1	Turn off the power using the switch on the node power supply.
2	Disconnect the SCSI interface cable from the coprocessor free edge. (It runs between the WSI2 and the drive tray above it.) This may require removal of an additional cable to gain access (PIN interface). Note the position of both cables as you remove them.
3	Remove the WSI2 assembly by using the extraction/ insertion levers.
4	Verify that the replacement WSI2 assembly pinning matches the existing board.

Table 4-3 WSI2 Board Replacement Procedure (continued)

Step	Action
5	Ensure that the replacement WSI2 assembly has the proper size coprocessor memory (complement of board/s) properly mounted on the coprocessor board. These boards are plugged into sockets on the coprocessor board and then fastened with two screws each. Remember that the WSI2 and coprocessor memory are ordered separately.
6	Insert the replacement WSI2 assembly using the extraction/insertion levers.
7	Reconnect the cables removed in step 2. (SCSI and PIN interface cables).
8	The node is ready for power on and loading. Turn on the power switch located on the AXM node power supply.
9	Perform the node loading procedures. Reference: >> *AXM System Administration* manual (Section 3).
10	The following steps (11 –14) are not required if your coprocessor system does not use licensed software options.
11	Obtain a temporary Honeywell license file by calling the Honeywell Technical Assistance Center (TAC), using telephone number 1-800-822-7673. Inform them that you have changed your Application ModuleX coprocessor hardware. You will receive instructions on exactly what changes to make to you license file. The change allows licensed options to execute and has an expiration date. Before the expiration date, a permanent Honeywell license key must be obtained. Reference >> Licensing Installation and Administration AXM, Section 4 - Installing the License File
12	The new coprocessor hardware identification number (unique to each coprocessor board) must be obtained to start the process of replacing your Kinet software license key. The new coprocessor hardware identification number is obtained by performing the following steps: • Sign on as a user using a network connected station or the coprocessor console terminal. • Enter the command “/etc/lanscan”. The 12 characters after “0x” under Station Address is the new coprocessor hardware identification number.

Table 4-3 WSI2 Board Replacement Procedure (continued)

Step	Action
13	Having obtained the new hardware identification number, call the Honeywell Technical Assistance Center (TAC), using telephone number 800-822-7673. Inform them that you have changed your Application Module^X coprocessor hardware and give them the new hardware identification number. Honeywell will then provide a new Kinet license key that is correlated to the new hardware identification number.
14	Enter the new Kinet license key information into the Kinet software configuration data for your system.

4.5 WSI2 I/O Board replacement

Overview

Node power must be turned off for the purpose of changing circuit boards in the AXM node.

> **WARNING**
>
> **Damage Can Result—**Circuit board damage can result if you do not practice proper ESD procedures or attempt to remove/insert a circuit board with node power applied.

> **CAUTION**
>
> **Mandatory Steps—**It is mandatory that appropriate software shutdown procedures are followed for the AXM coprocessor prior to removing power from the AXM node.
>
> Failure to do so can cause damage to the HP-UX file structure on the coprocessor hard disk.

> **ATTENTION**
>
> It is also highly recommended that you perform a node processor software shutdown when preparing to power off the AXM node. This provides for an orderly departure from the LCN network.

Locating shutdown procedure

Software shutdown procedures for both the AXM coprocessor and node processor are documented in the Application ModuleX System Administration manual.

WSI2 I/O board Replacement Procedure

Table 4-4 WSI2 I/O Board Replacement Procedure

Step	Action
1	Turn off the power using the switch on the node power supply.
2	Disconnect the cables from the WSI2 I/O board. Pay attention to the marking on the cables. These cables must be returned to their appropriate positions after installing the new board.
3	Remove the board using the two screws which secure the faceplate to the chassis. (Extraction/ insertion levers may exist in place of screws for early production units.)

Table 4-4 WSI2 I/O Board Replacement Procedure (continued)

Step	Action
4	Insert the replacement board and secure the screws. (Extraction/insertion levers exist in place of screws on non-CE compliant units.)
5	Reconnect the cables removed in step 2.
6	The node is ready for power on and loading. Turn on the power switch located on the A^{X}M node power supply.
7	Perform the node loading procedure. Reference the Application Module^{X} System Administration manual for the detailed procedure, if required.

4.6 Media Access Unit Replacement Procedure

Overview

The replacement of the MAU is a simple procedure. It does not require powering off the A^{X}M nor any special actions on the PIN (network).

> CAUTION
>
> Replacing the MAU with power on in the A^{X}M node does require that proper care must be exercised to prevent the cable ends from touching any possible grounded or electrically charged object.

Table 4-5 Procedures for Replacement of MAU

Step	Action
1	Gain access to the MAU and its connected cables.
2	Remove the LAN (ethernet) cable connection to MAU first.
3	Remove the A^{X}M interface cable from the MAU. (The opposite end of this cable connects to the WSI2 I/O board J6.)
4	Connect the A^{X}M interface cable to the replacement MAU.
5	Connect the LAN (ethernet) cable to the MAU.

Section 5—Hard Disk Drive Tray

5.1 Drive Tray Description

Overview

The Hard Disk Drive Tray (HDDT) contains the coprocessor hard disk drive(s). A maximum of two drives can exist in this tray.

The primary (first) drive is always mounted on the right side. This is done for cooling reasons and must be adhered to in all cases. This drive will always have device address 6 (physical pinning).

An optional second drive is mounted on the left side. This drive will always have device address 5 (physical pinning).

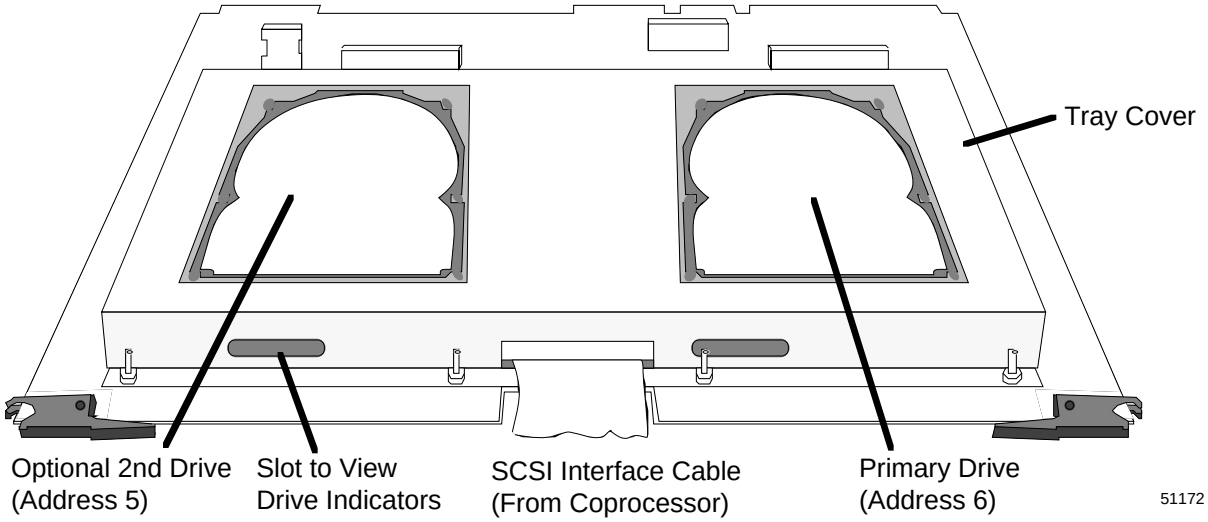
A printed circuit board in the tray is used to provide a means of connecting the SCSI bus to each drive as well as routing it through the backplane to the HDDT I/O board. DC power from the backplane is also routed through this board to the disk drives.

Disk drives are separately replaceable in the event of failure. The drive tray (including internal circuit board) is only replaceable as a single unit. When ordering a replacement drive tray, it will be supplied without drives. Disk drives are ordered separately.

The spare parts section of this manual supports this replacement strategy.

Hard disk drive tray (front view)

The following illustration shows the hard disk drive tray as you would see it after removing it from the node chassis. Notice the placement of the disk drives. The primary drive is always mounted on the right side of the tray.



Disk drive physical placement and connections

The diagram below shows the drive tray from the opposite end when compared to the diagram above. Notice the following:

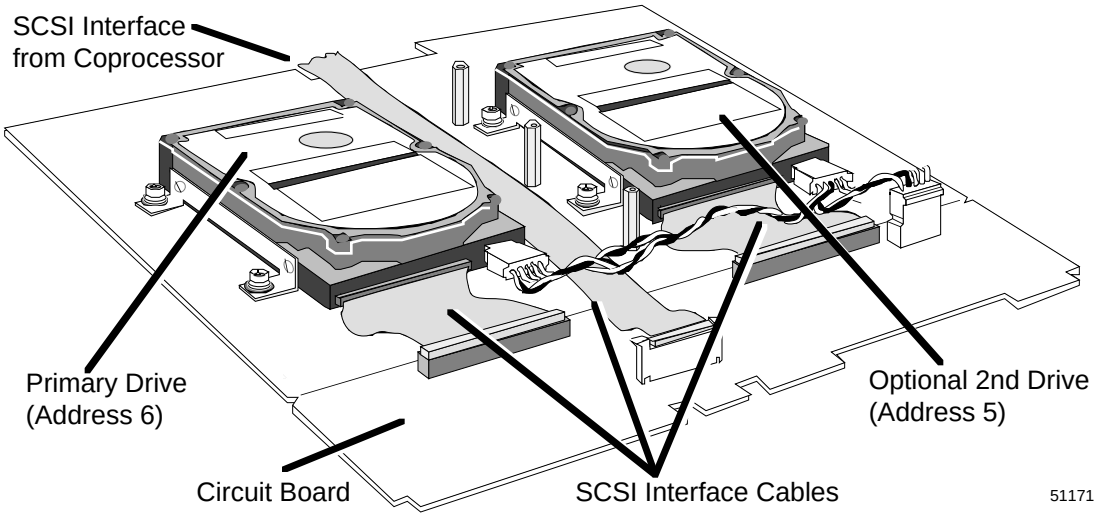
- Physical position of each drive
- Drive tray internal circuit board
- SCSI interface ribbon cable for each drive

Disk drives currently originate from several different manufacturing sources. Their drive mounting and electrical connection properties are identical.

Each available disk drive is described later in this section.

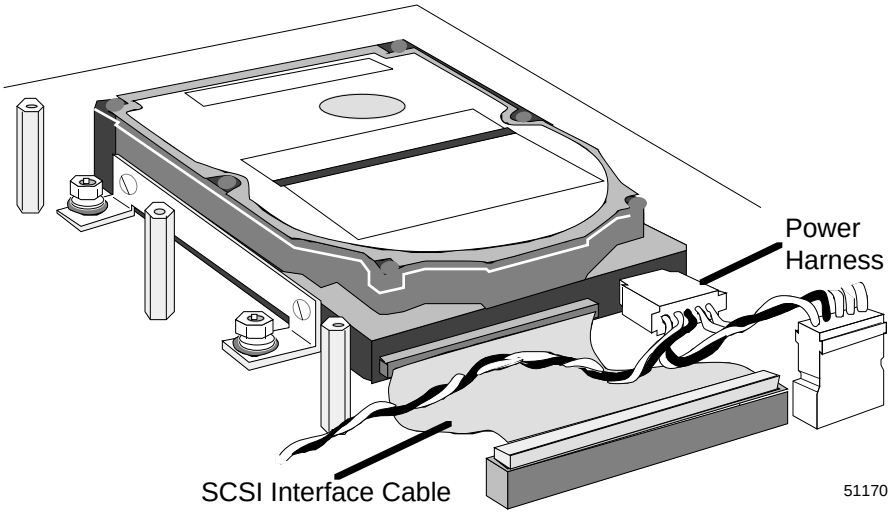
Hard disk drive tray (rear view)

This is a view of the hard disk drive tray from the rear side of the board. Notice the SCSI interface cables. The SCSI interface originates at the free edge of the coprocessor board on the WSI2 assembly.



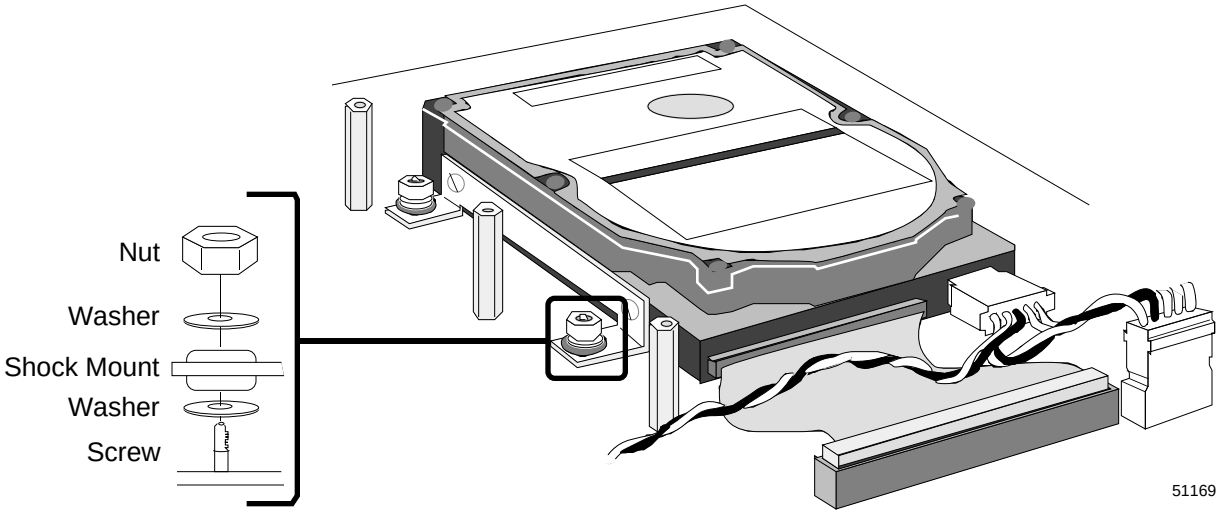
Drive connection detail

The following illustration gives greater detail to show the drive SCSI interface cable and power harness.



Drive mounting details

The following illustration gives the drive mounting hardware detail. All four mounting screws (one at each corner of the drive) are identical.



Disk drives

Several types of disk drives are available for use in the drive tray. The following table identifies the drive types currently available. The drives of the same capacity (although from different manufacturers) are functionally the same. An order for a specific size spare drive will be filled with one from a vendor listed in the following table.

It is imperative that you can identify the different drive types by looking at the physical drive and the markings on it. Each drive type will have uniquely different physical pinning requirements associated with it. Drive pinning details are separately defined in the information following the table below.

Table 5-1 Disk Drives Currently Available

Capacity	Manufacturer	Identification Marking on Drive
525 MB	Quantum	Hewlett Packard model no. A4280A Quantum model no. LPS525S
525 MB	Seagate	Hewlett Packard model no. A4280A Seagate model no. ST3600N
1.2 GB	Digital	Hewlett Packard model no. A2398A Digital model no. DSP 3107L
1.2 GB	Quantum	Hewlett Packard model no. A2398A Quantum model no. LPS1080S
1.2GB	Quantum	Hewlett Packard model no. A2398A Quantum model no. VP31110
1.2 GB	Seagate	Hewlett Packard model no. A2398A Seagate model no. ST31200
2 GB	Quantum	Hewlett Packard model no. S1164A Seagate model no. VP32210
2GB	Seagate	Hewlett Packard model no.S1164A Seagate model no. ST32430N
2GB	Hewlett Packard	Hewlett Packard model no. S1164A Seagate model no. C3325A

Considerations for ordering replacement drives

The only thing to consider when ordering a replacement disk drive is drive capacity.

The spare drive is supplied properly formatted, but without HP-UX software.

If the primary drive is the one being replaced, the appropriate recovery procedure must be used to boot from “HP-UX Install” DAT tape on an alternate boot source such as a DAT drive connected locally or remote DAT drive accessible over the network. Upon successful boot, a complete software restore must be performed from a previously customer generated DAT drive “Backup Tape” (or other available source). This will restore the coprocessor file system to reflect conditions that existed when the “Backup Tape” was generated.

If the second (optional drive) is being replaced, the coprocessor will boot successfully from the primary drive. The new replaced second drive can be put under system control using the “mount” command without any preparation steps. A software restore must be performed from a previously customer generated DAT drive “Backup Tape” (or other available source). This will restore the coprocessor file system to reflect conditions that existed when the “Backup Tape” was generated.

The parts list in the last section of this manual provides the drive part numbers.

Procedures for booting from a DAT drive to recover from a failed primary hard drive are provided in the *AXM System Administration* manual. Procedures for creating “Backup tapes” and software restore operations are provided in the same manual.

Replacement drives taken from another AXM or UXS

Appropriate care must be exercised when a replacement disk drive does not come directly from Honeywell spare parts (from hot spares or training system).

If the primary drive is replaced with a drive containing files from another system, it may have to have the proper files resident to allow a software boot operation; (i.e., it was the primary drive in the previous system). The coprocessor will boot from this replacement device and assume the exact configuration that existed on the previous system. After making the appropriate configuration changes to access the PIN network, a complete software restore from customer generated DAT drive “Backup Tape” (or other available source) is required to get the coprocessor file structure to reflect conditions existing prior to drive replacement.

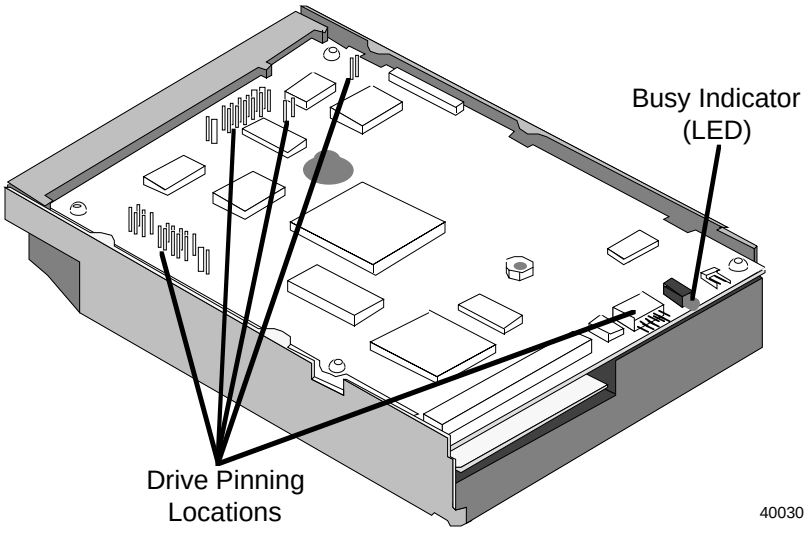
If the primary drive is replaced by a drive that was the second drive on another system, the appropriate recovery procedure must be used to boot operating software from an alternate boot source such as a DAT drive. This DAT drive may be locally connected or accessible over the network. A complete software restore is required to get the coprocessor file structure to reflect conditions existing prior to drive replacement.

If the optional second drive is replaced with a drive containing files from another system, the existing files must be discarded by initializing the drive and then performing a software restore operation from customer generated DAT drive “Backup Tape” (or other available source) before returning the replaced drive under system control using the “mount” command.

5.2 525 MB Quantum Disk Drive (LPS525S)

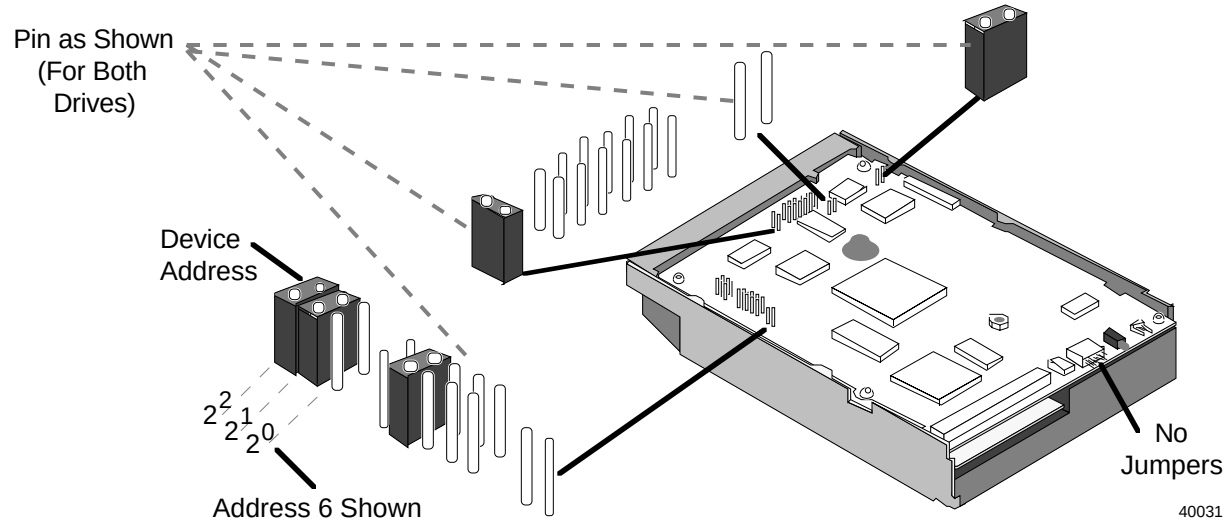
Introduction

The diagram shows a 525 MB Quantum drive. Notice the identified parts.

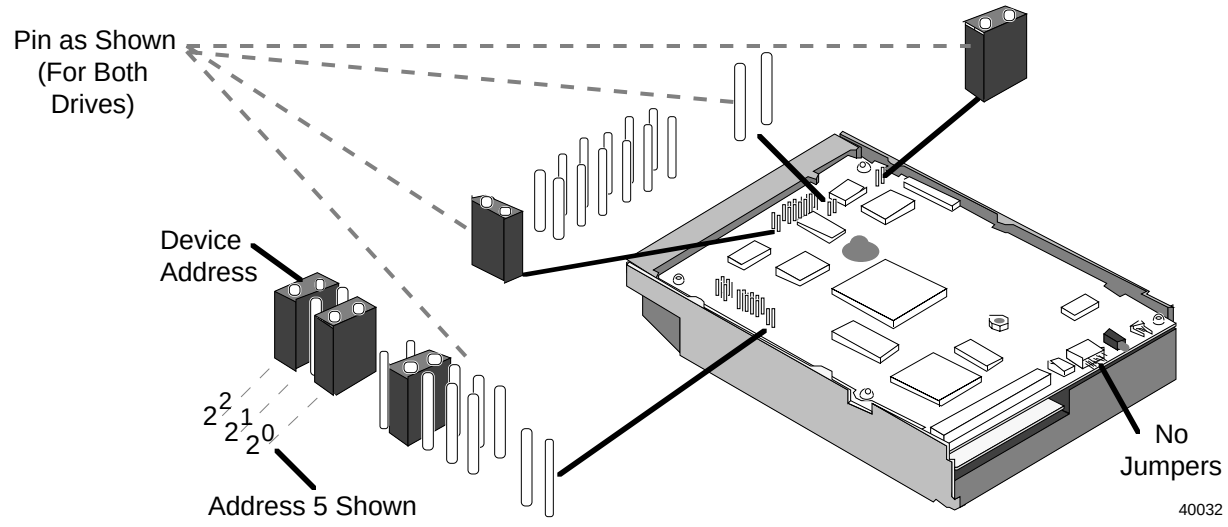


525 MB Quantum drive pinning

The only pinning that should be required is the SCSI interface device address. The drive on the right of the tray is always address 6 and the optional drive on the left is always address 5. The remaining option jumpers should be correct from the factory. A quick check is always advised.



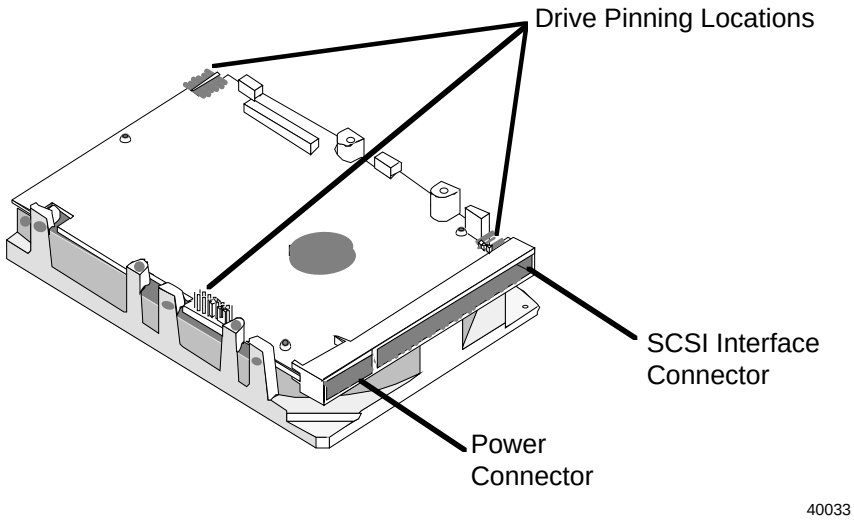
The following diagram is the same as the previous diagram with the exception of the device address pinning (address 5).


Pin as Shown
(For Both
Drives)
Device
Address
2^2
2^1
2^0
Address 5 Shown
No
Jumpers
40032

5.3 525 MB Seagate Drive (ST3600N)

Introduction

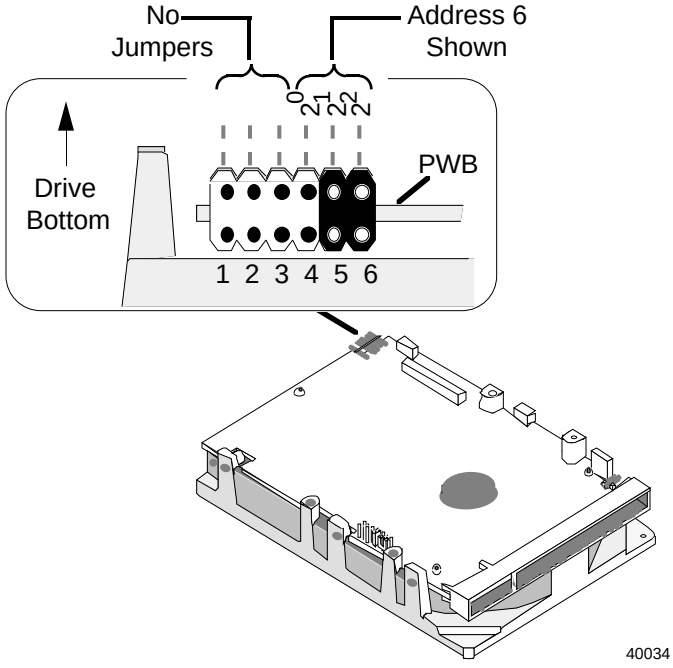
The diagram shows a 525 MB Seagate drive.



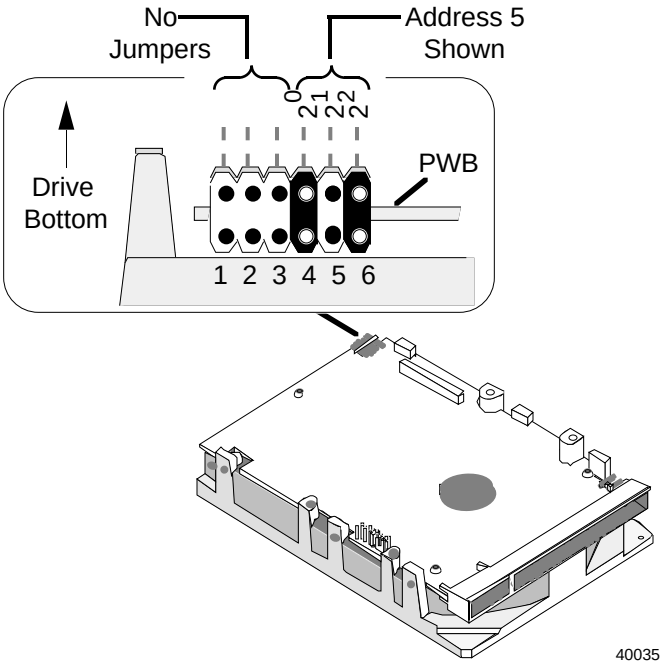
525 MB Seagate drive address pinning

The pinning to define the device address on the SCSI interface bus must be done. The drive on the right of the tray is always pinned for address 6 and the optional drive on the left is always pinned for address 5.

The diagram at the right illustrates the pinning for address 6. Notice that the drive is shown upside down.



The following diagram is the same as the previous diagram with the exception of address 5 instead of 6.

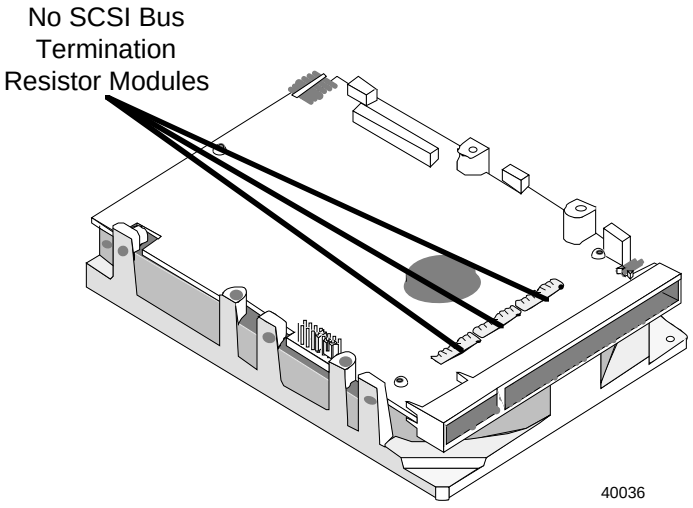


525 MB Seagate drive SCSI interface termination

The Seagate drives have the capability to provide termination for the SCSI interface cable. This feature is not needed for the A^{X}M application since a terminator is placed at the end of the SCSI cable network on the HDDT I/O board.

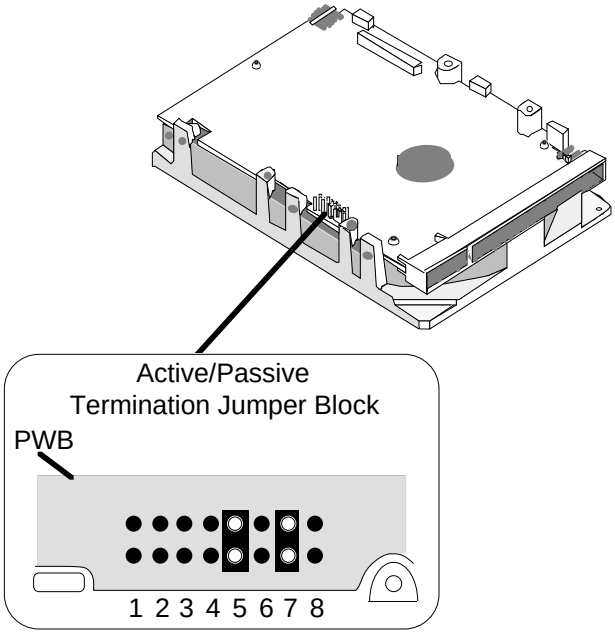
The diagram illustrates the missing termination resistor modules on the drive. Replacement drives may have these resistor modules in place. Remove them if they are present. This applies to both possible drives in the disk tray.

Notice that the drive is shown upside down. You cannot see the terminator resistor module locations once the drive is installed.



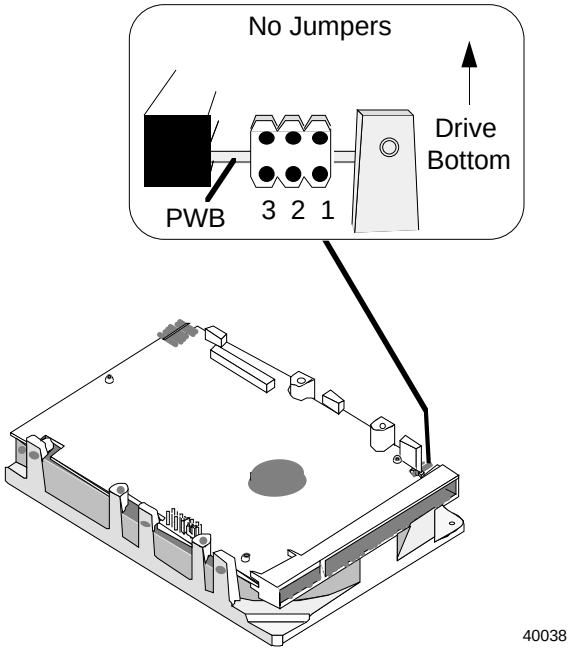
525 MB Seagate drive termination/ parity pinning

Both drives 5 and 6 should have these options pinned as illustrated in the diagram.



525 MB Seagate drive unused pinning

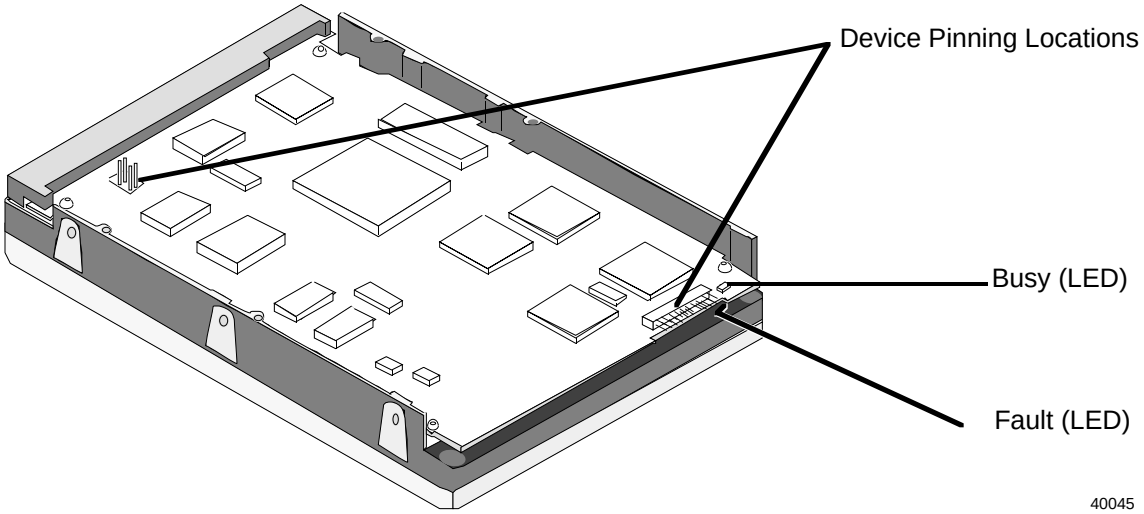
There are no option jumpers required in this location as illustrated in the diagram. This applies to both possible drives in the disk tray.



5.4 1.2 GB Digital Equipment Corp. Drive (DSP3107L)

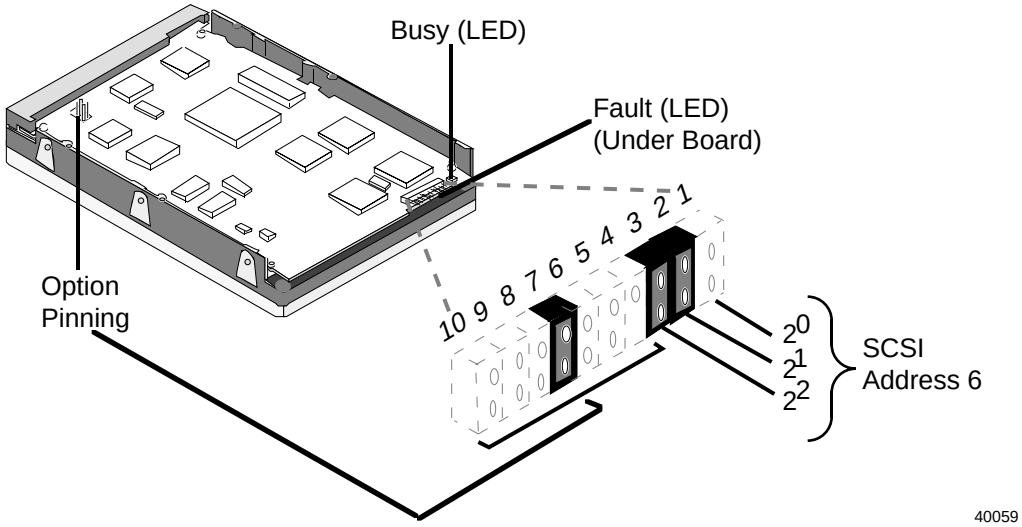
Introduction

The diagram shows a 1.2 GB Digital Equipment Corporation disk. The drive is shown upside down. Notice the identified pinning locations and indicators.



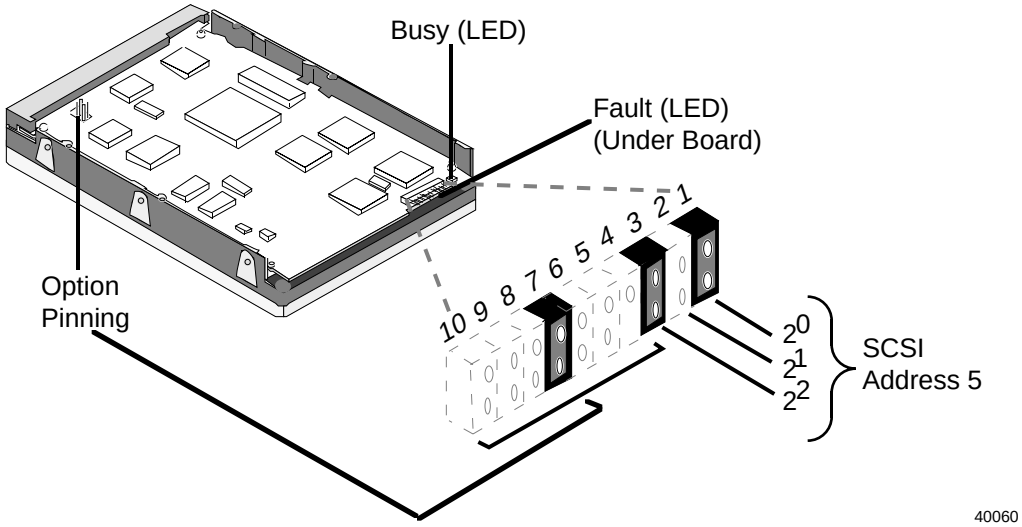
1.2 GB DEC drive SCSI address pinning (address 6)

The illustration below shows the proper drive pinning for SCSI address 6.



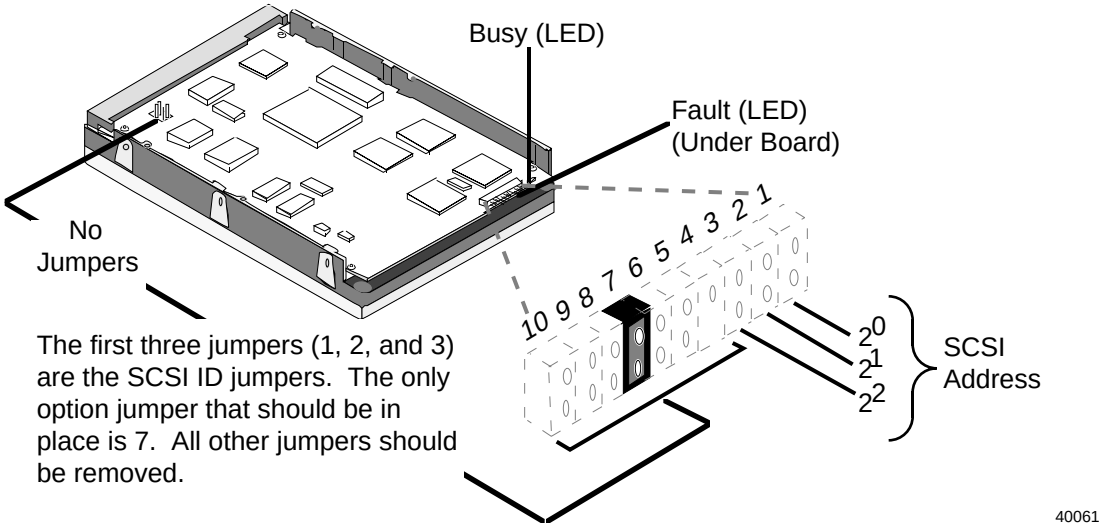
1.2 GB DEC drive SCSI address pinning (address 5)

The illustration below is identical to the previous diagram with the exception of SCSI address 5.



1.2 GB DEC drive SCSI termination pinning

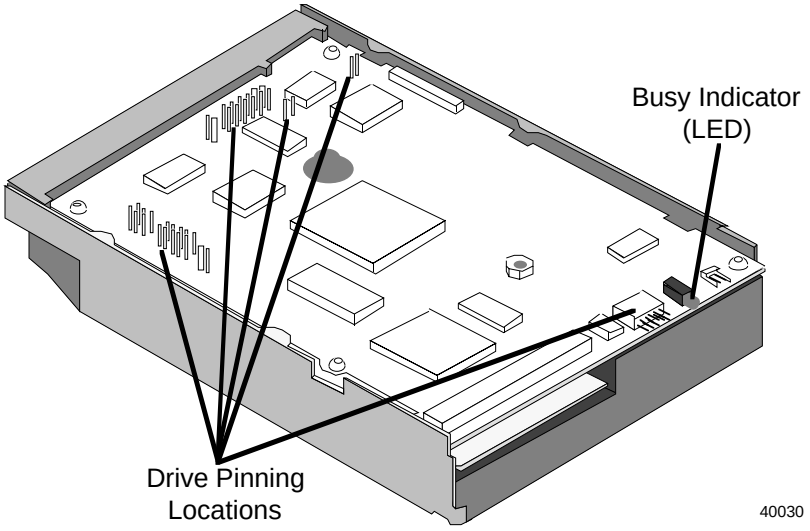
The SCSI termination pinning options provided on the drive are not used in the AXM. They should all be removed if they are present. This applies to both possible drives in the disk tray


Busy (LED)
Fault (LED)
(Under Board)
No
Jumpers
10 9 8 7 6 5 4 3 2 1
2^0
2^1
2^2
SCSI
Address
The first three jumpers (1, 2, and 3) are the SCSI ID jumpers. The only option jumper that should be in place is 7. All other jumpers should be removed.
40061

5.5 1.2 GB Quantum Drive (LPS1080S)

Introduction

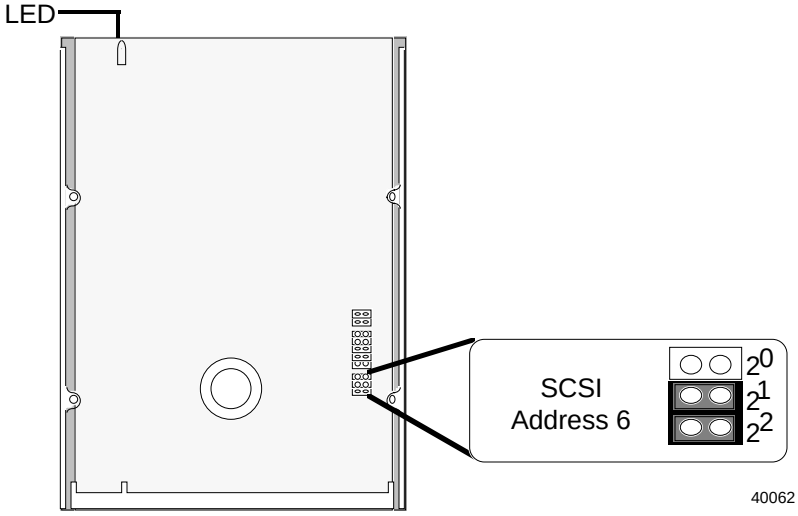
The diagram below illustrates the 1.2 GB Quantum disk drive. The drive is shown upside down. Notice the identified pinning locations and “Busy” indicator.



1.2 GB Quantum drive SCSI address pinning (address 6)

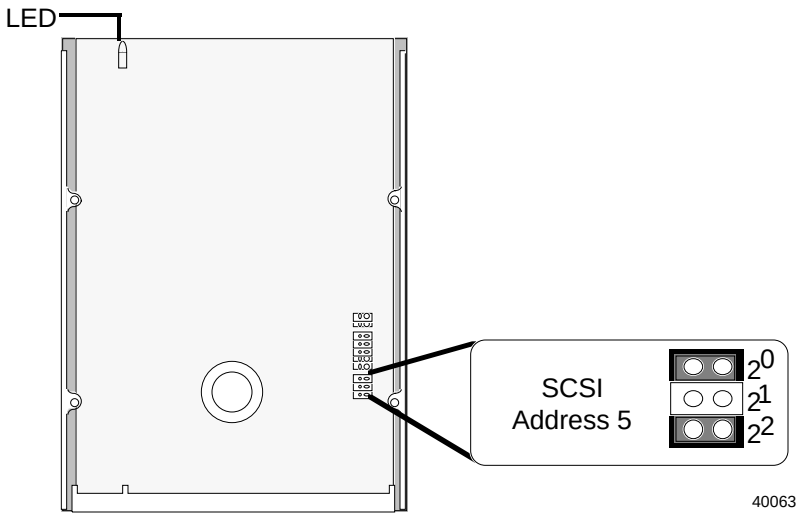
The diagram below identifies the pinning required for SCSI address 6.

.



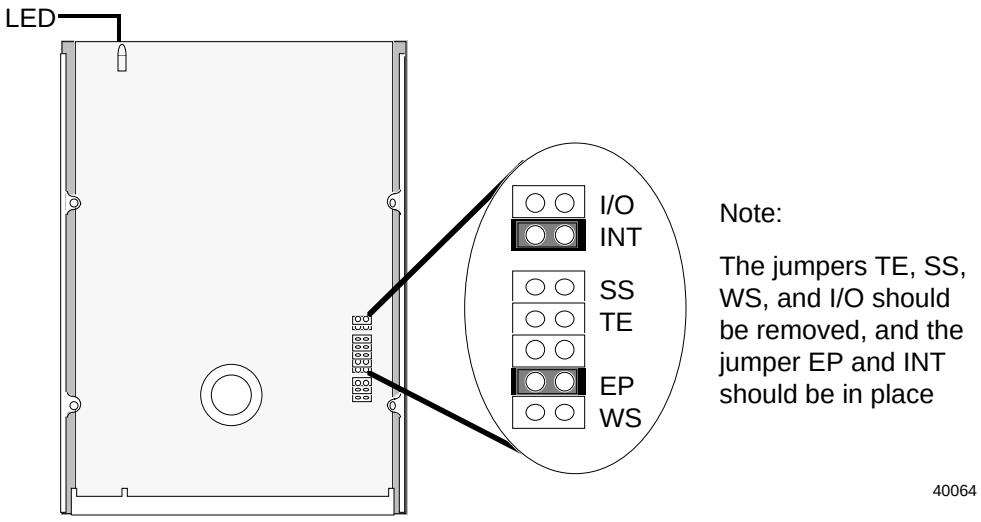
SCSI address pinning (address 5)

The diagram below is identical to the one above with the exception for the SCSI address 5.



1.2 GB Quantum drive option pinning

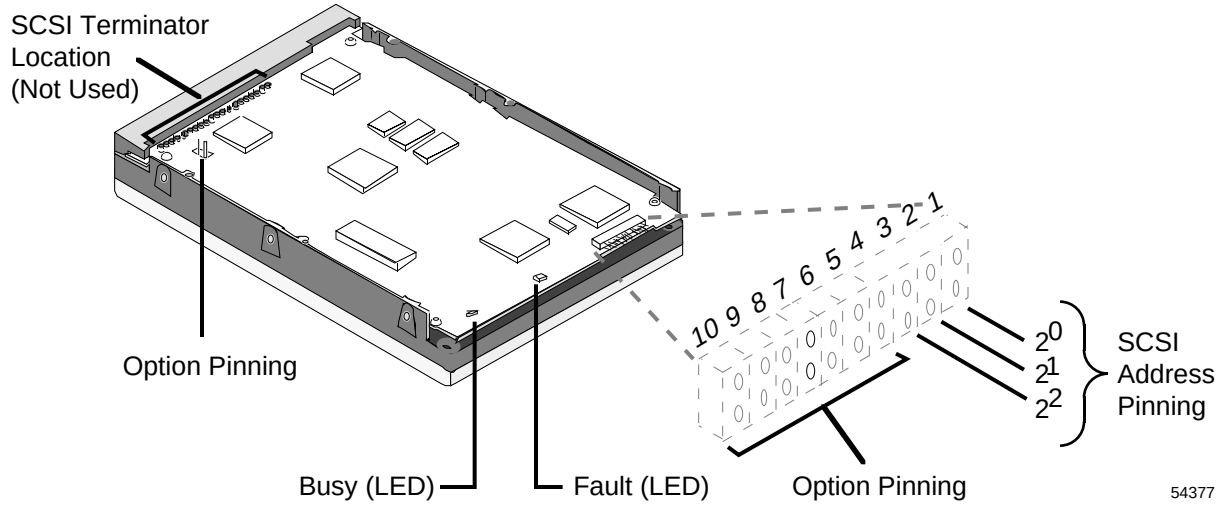
The following diagram illustrates the drive option pinning for use in the A^{X}M. Both drives must have the options pinned as shown.



5.6 1.2 GB Quantum Drive (VP31110)

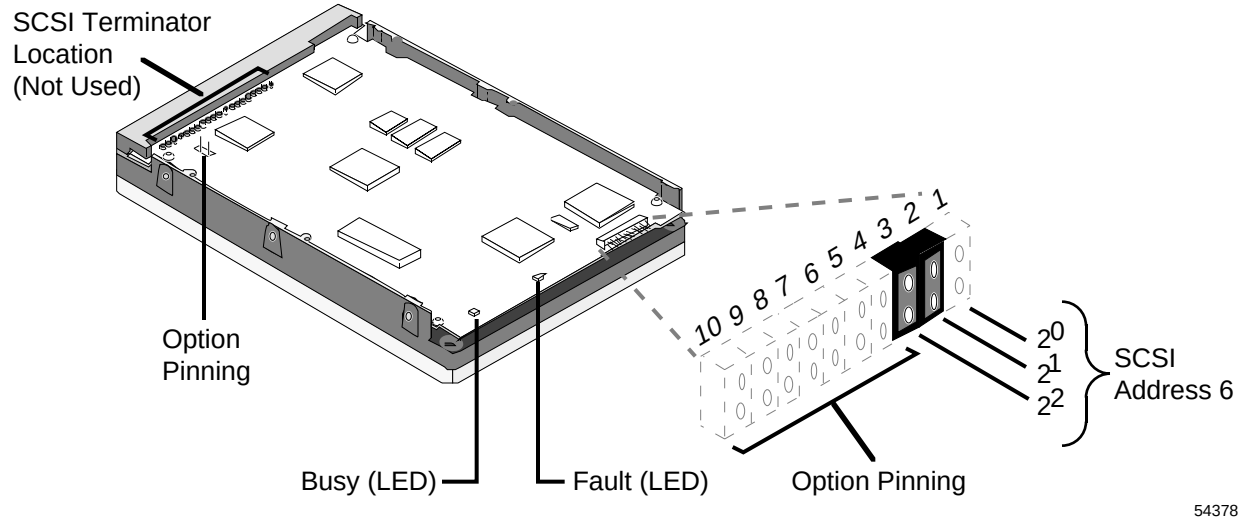
Introduction

The diagram below illustrates the 1.2 GB Quantum (VP31110) disk drive. The drive is shown upside down. Notice the identified pinning locations and “Busy” indicator.



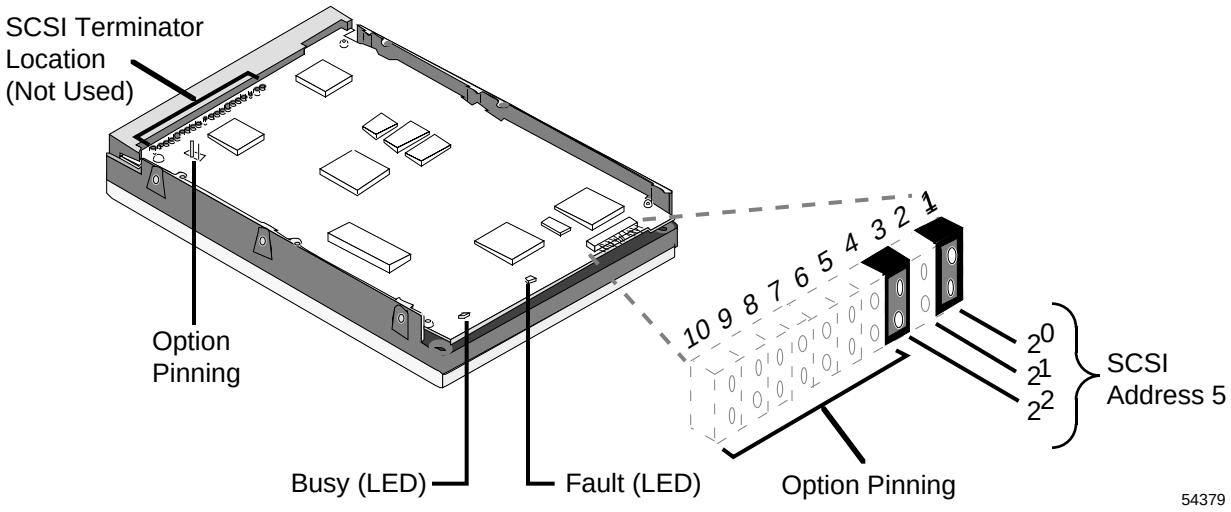
1.2 GB Quantum drive (VP31110) SCSI address

The diagram below identifies the pinning required for SCSI address 6.



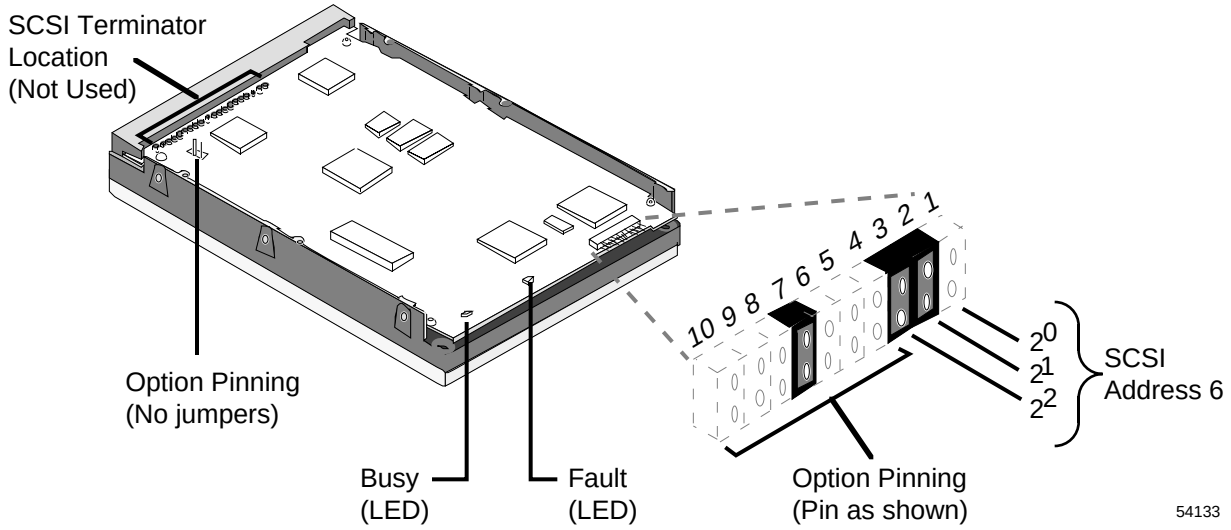
SCSI address pinning (address 5)

The diagram below is identical to the one above with the exception for the SCSI address 5.



1.2 GB Quantum drive (VP31110) option pinning

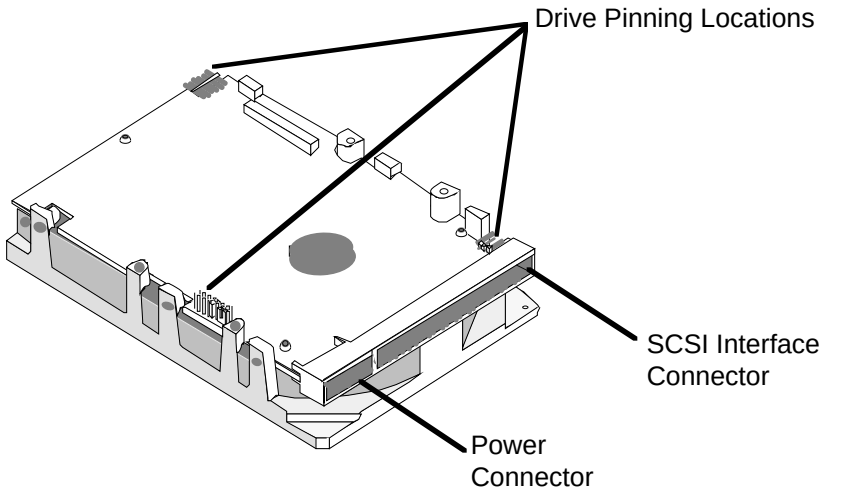
The following diagram illustrates the drive option pinning for use in the A^{X}M. Both drives must have the options pinned as shown.



5.7 1.2 GB Seagate Drive (ST31200)

Introduction

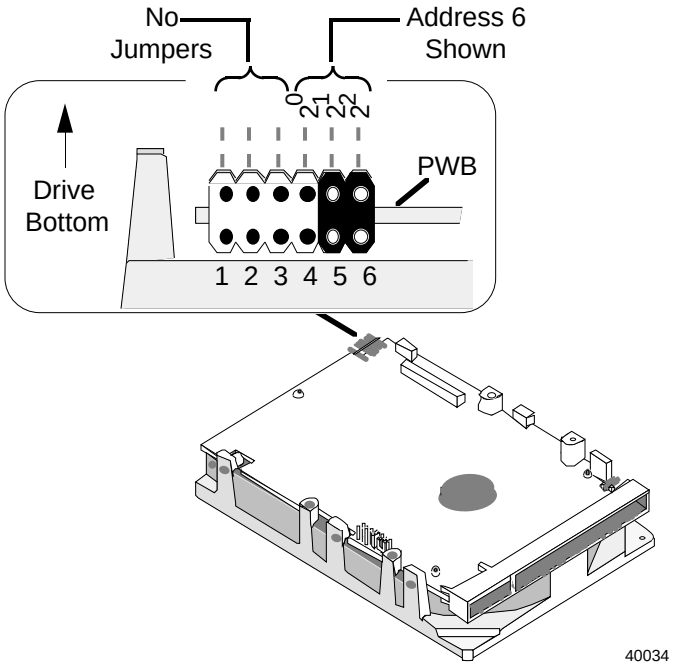
The diagram shows a 1.2 GB Seagate drive. The drive is shown upside down. Notice the identified pinning locations and SCSI terminator resistor module locations.



1.2 GB Seagate drive address pinning

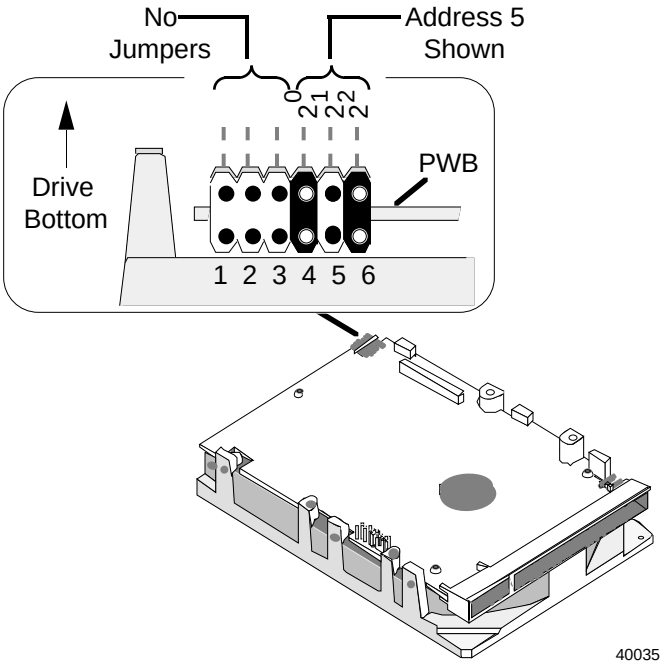
The pinning to define the device address on the SCSI interface bus must be done. The drive on the right of the tray is always pinned for address 6 and the optional drive on the left is always pinned for address 5.

The following diagram illustrates the pinning for address 6. Notice that the drive is shown upside down.



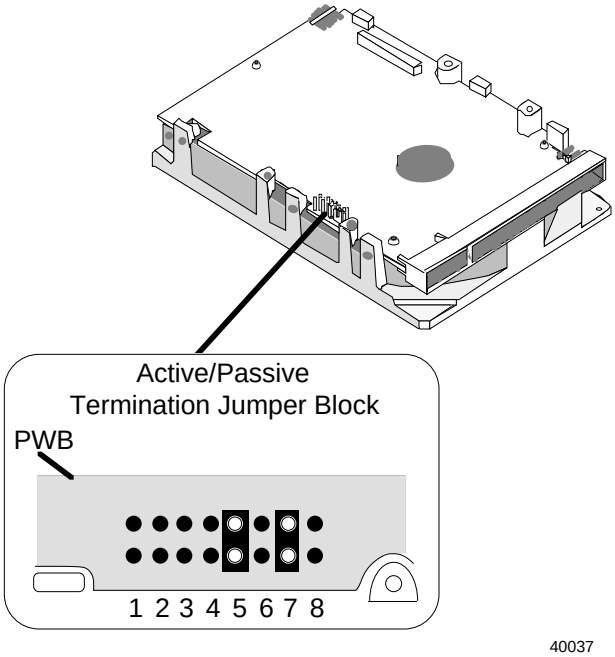
Drive address 5

The diagram below illustrates the same drive pinned for address 5.



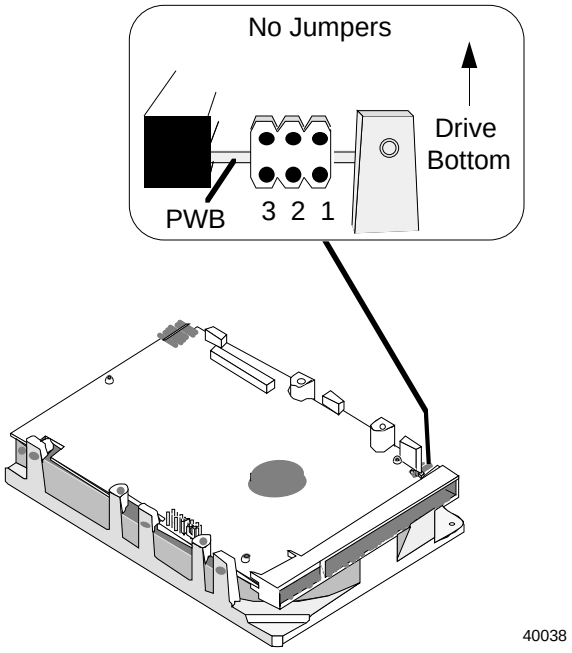
1.2 GB Seagate drive termination/ parity pinning

Both drives 5 and 6 should have these options pinned as illustrated in the diagram.



1.2 GB Seagate drive unused pinning

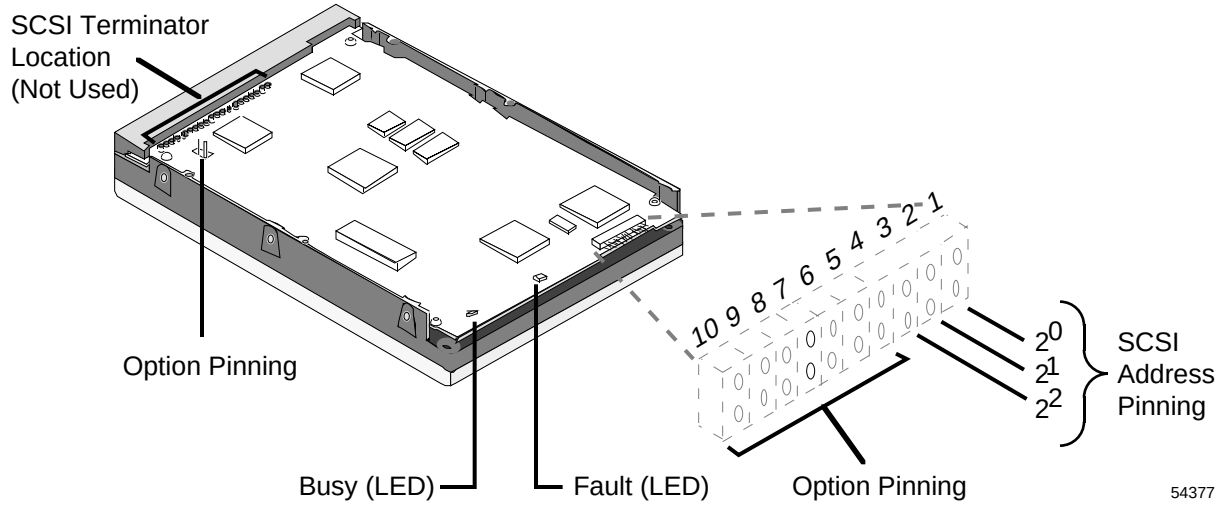
There are no option jumpers allowed in this location as illustrated in the diagram.



5.8 2 GB Quantum Drive (VP32210)

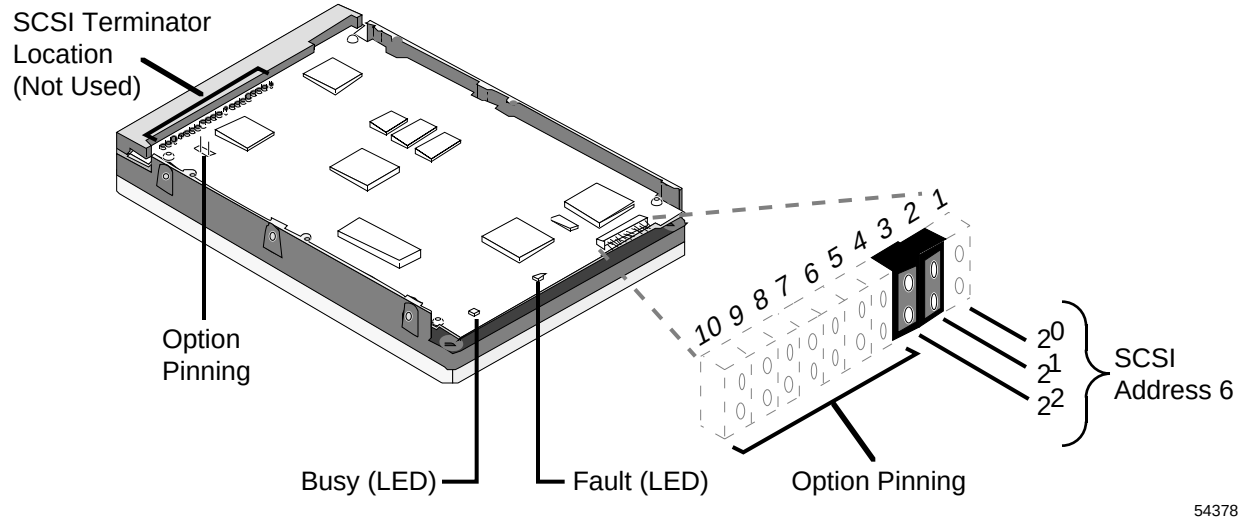
Introduction

The diagram below illustrates the 2 GB Quantum (VP32210) disk drive. The drive is shown upside down. Notice the identified pinning locations and “Busy” indicator.



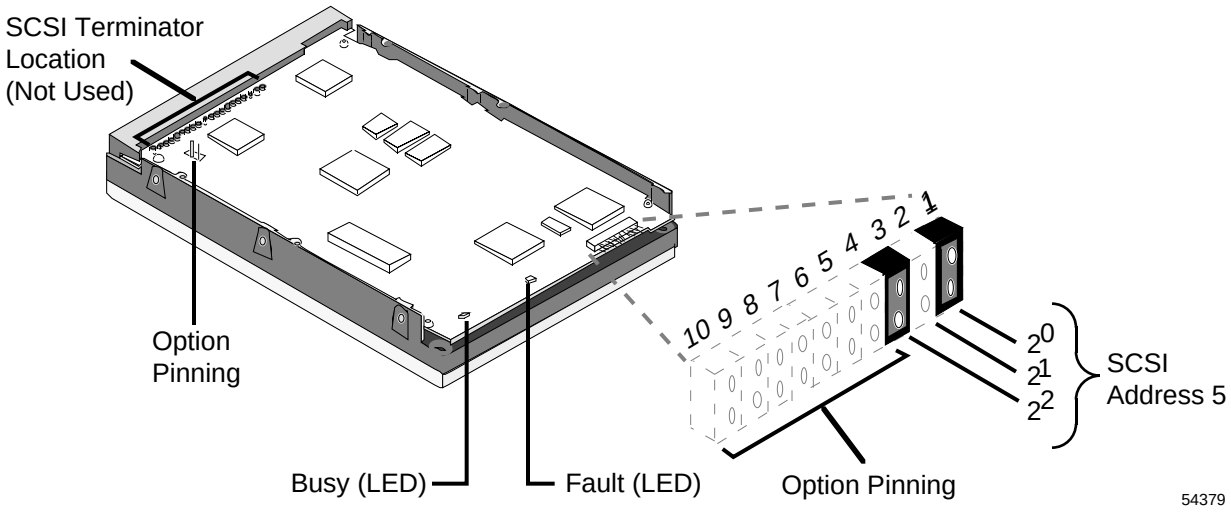
2 GB Quantum drive (VP32210) SCSI address

The diagram below identifies the pinning required for SCSI address 6.



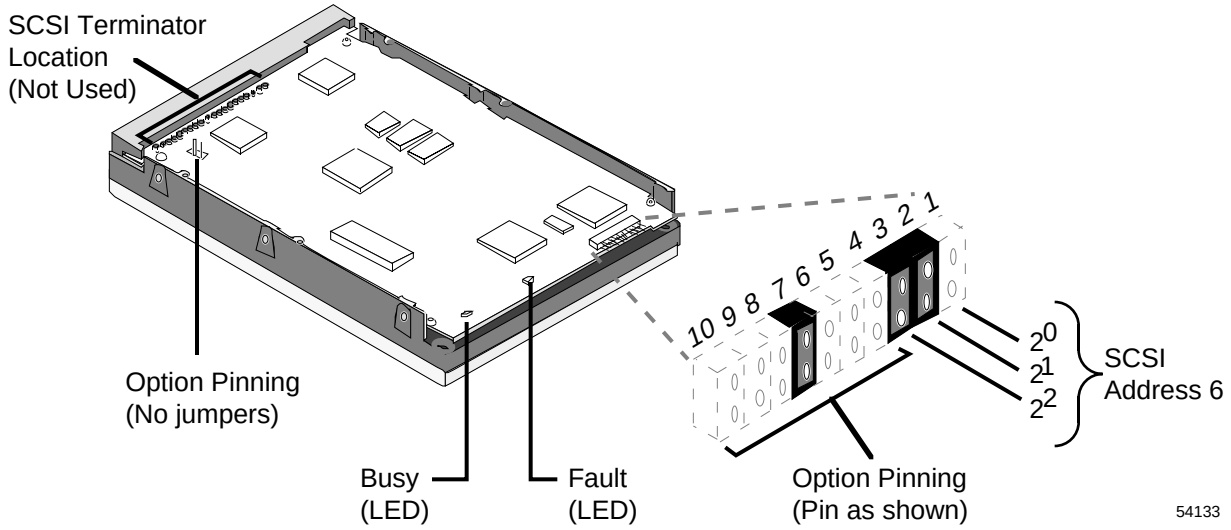
SCSI address pinning (address 5)

The diagram below is identical to the one above with the exception for the SCSI address 5.



2 GB Quantum drive (VP32210) option pinning

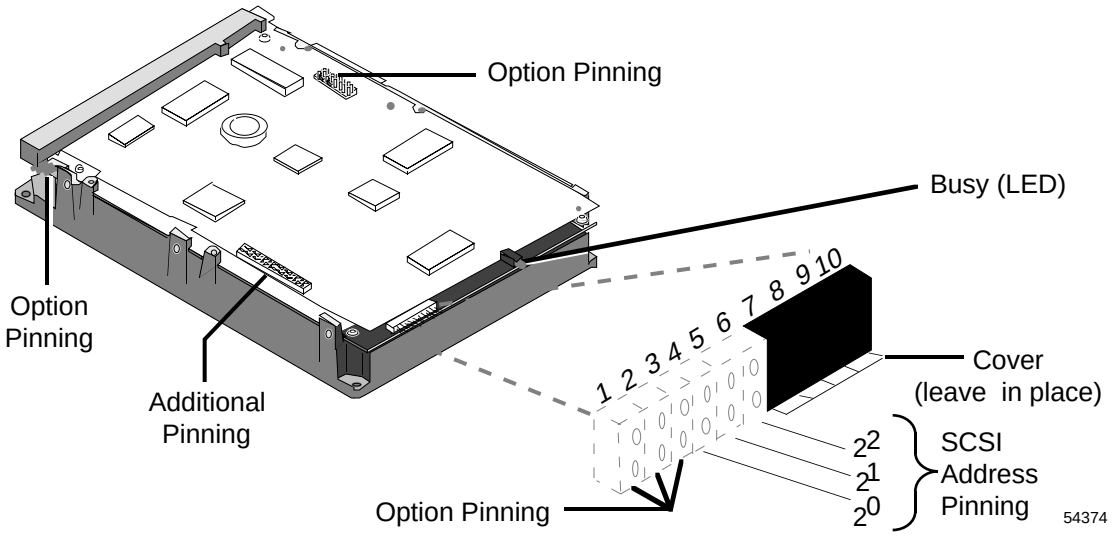
The following diagram illustrates the drive option pinning for use in the A^{X}M. Both drives must have the options pinned as shown.



5.9 2 GB Seagate Drive (ST32430N)

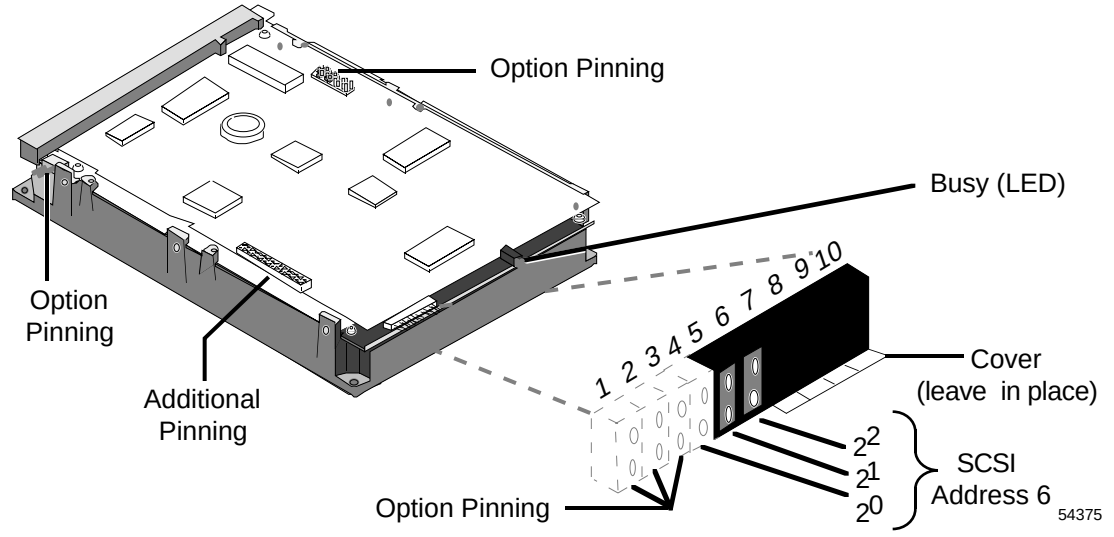
Introduction

The diagram below illustrates the 2 GB Seagate (ST23430N) disk drive. The drive is shown upside down. Notice the identified pinning locations and “Busy” indicator.



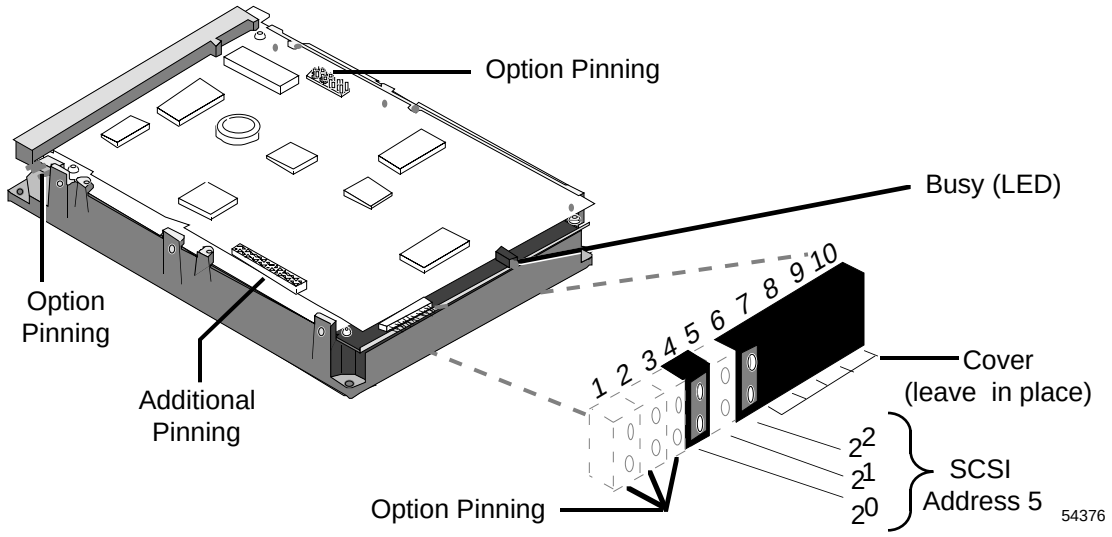
2 GB Seagate drive (ST32430N) SCSI address

The diagram below identifies the pinning required for SCSI address 6.



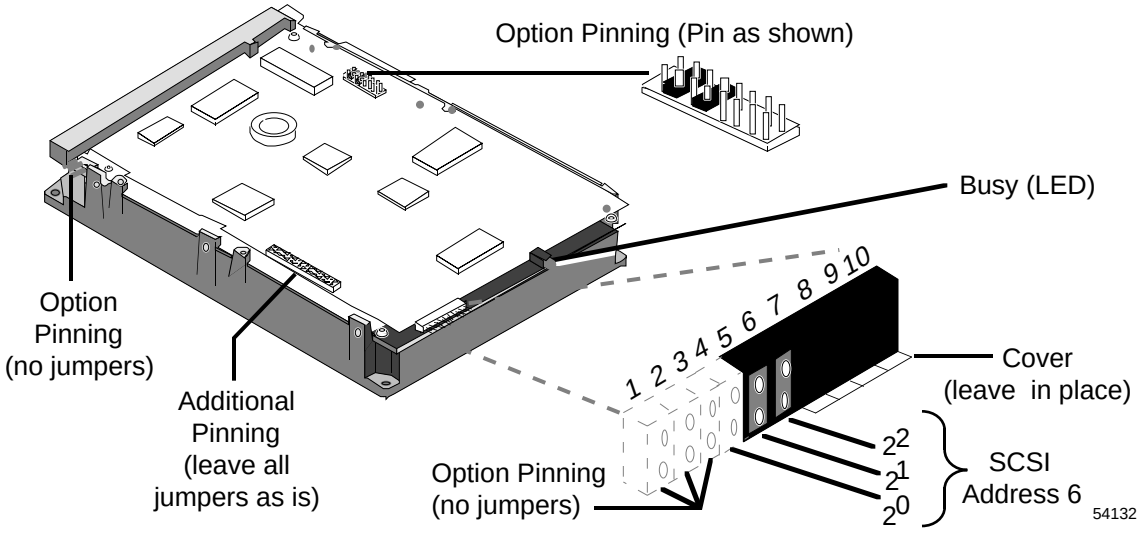
SCSI address pinning (address 5)

The diagram below is identical to the one above with the exception for the SCSI address 5.



2 GB Seagate drive (ST32430N) option pinning

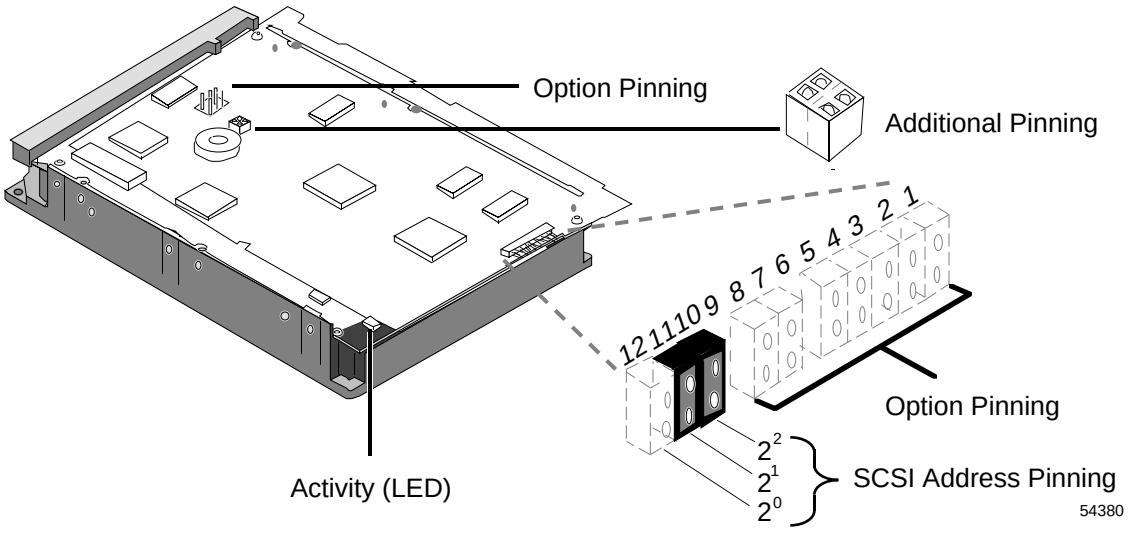
The following diagram illustrates the drive option pinning for use in the A^{X}M. Both drives must have the options pinned as shown.



5.10 2 GB Hewlett Packard Drive (C3325A)

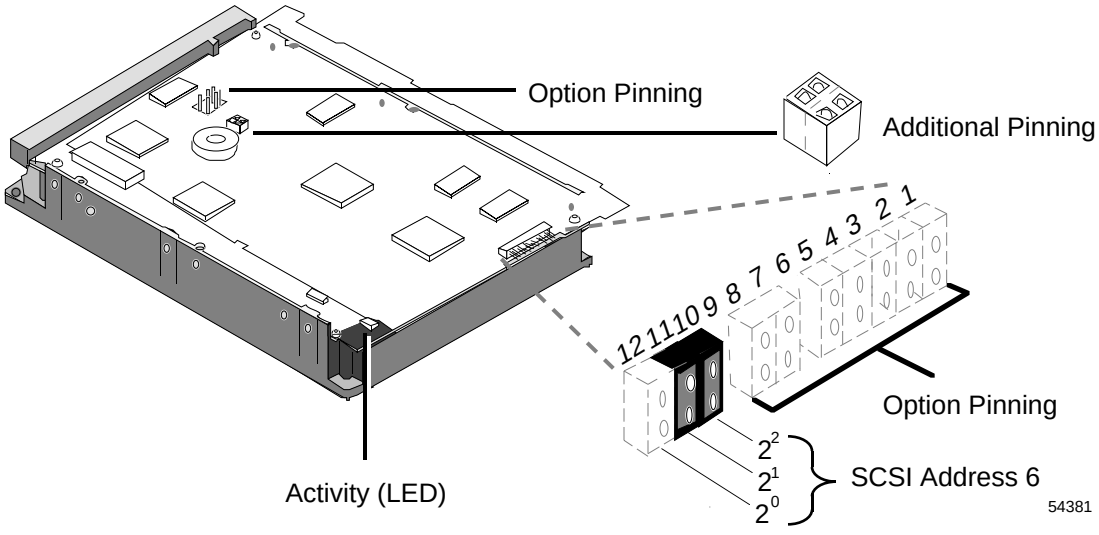
Introduction

The diagram below illustrates the 2 GB Hewlett (C3325A) disk drive. The drive is shown upside down. Notice the identified pinning locations and "Activity" indicator.



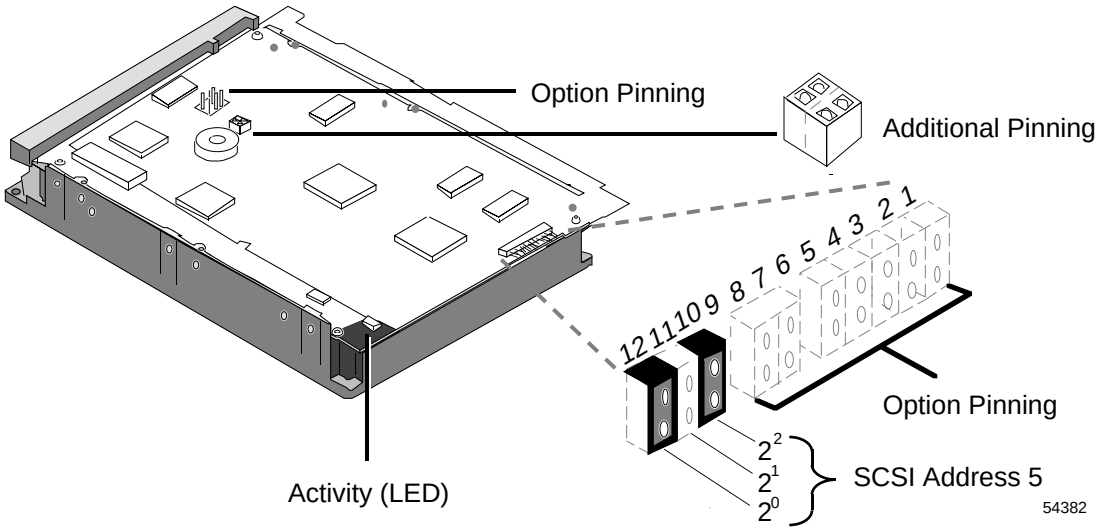
2 GB HP drive SCSI address pinning (address

The diagram below identifies the pinning required for SCSI address 6.



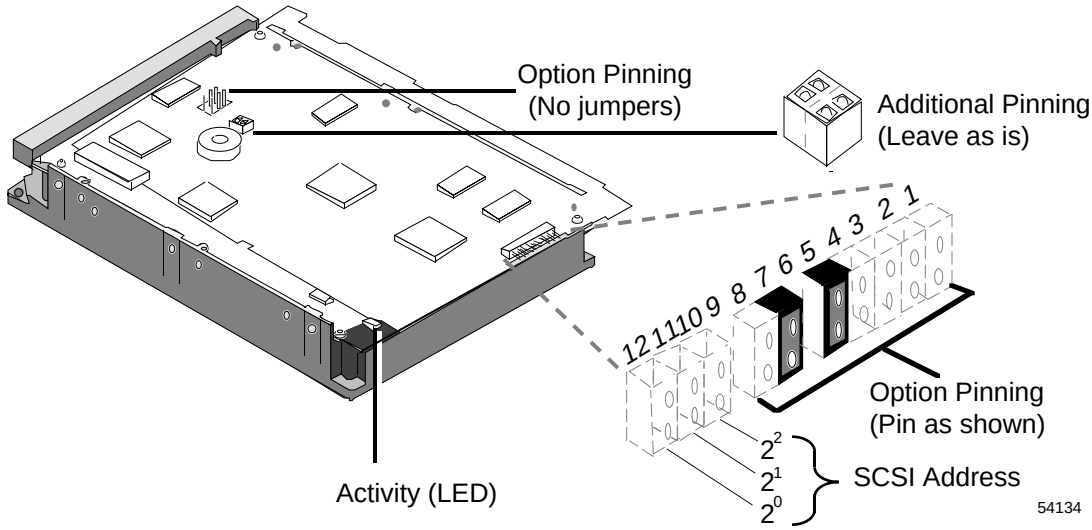
SCSI address pinning (address 5)

The diagram below is identical to the one above with the exception for the SCSI address 5.



2 GB HPdrive (C3325A) option pinning

The following diagram illustrates the drive option pinning for use in the A^{X}M. The option pinning also incorporates the proper SCSI termination (unterminated). Both drives must have the options pinned as shown.



5.11 HDDT I/O Board

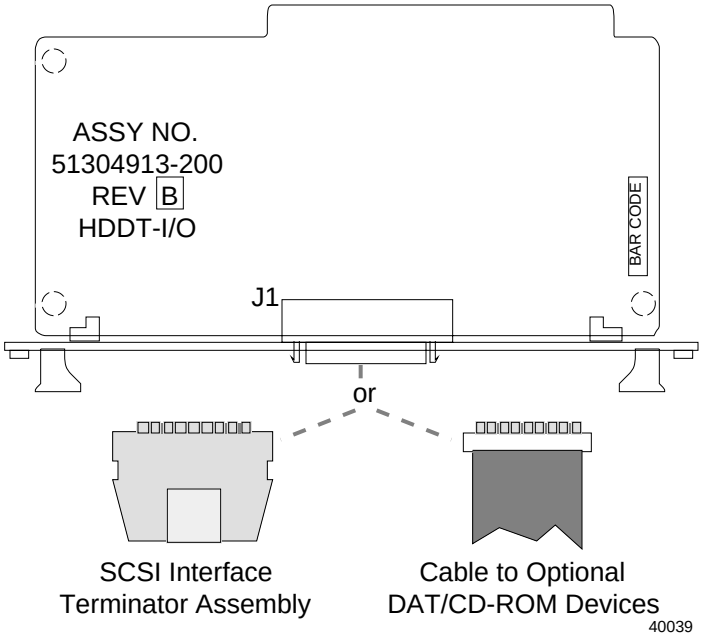
Description

The HDDT I/O board interfaces with the Hard Disk Drive Tray through the module backplane.

The coprocessor SCSI (disk drive) interface normally stops at connector J1.

If an optional DAT tape or CD-ROM device exists on your AXM, one end of the daisy-chain device interface cable connects to J1 of the HDDT I/O board. The device at the far end of this cable must be pinned to provide the SCSI interface termination.

If neither of the optional devices (DAT/CD-ROM) exists, an external terminator must be installed on J1 as illustrated.



5.12 Disk Drive/Drive Tray Replacement

Overview

Node power must be turned off for the purpose of removing the disk drive tray from the A^{X}M node.

> **WARNING**
>
> **Damage Can Result—**Circuit board damage can result if you do not practice proper ESD procedures or attempt to remove/insert a circuit board with node power applied.

> **CAUTION**
>
> **Mandatory Steps—**It is mandatory that appropriate software shutdown procedures are followed for the A^{X}M coprocessor prior to removing power from the A^{X}M node.
>
> Failure to do so can cause damage to the HP-UX file structure on the coprocessor hard disk.

> **ATTENTION**
>
> It is highly recommended that you perform a node processor software shutdown when preparing to power off the A^{X}M node. This provides for an orderly departure from the LCN network.

Tray removal/ replacement procedure

The drive tray is plugged into the Five- (or Ten-slot) chassis and occupies two board slots. It must be removed if a disk drive is to be inspected or replaced for any reason. The following procedure is summarized as follows:

Steps 1-5 in the following procedure cover the preparation steps for power off.

Steps 6-9 cover the disk drive tray removal.

Steps 10-15 cover the drive replacement.

Steps 16-18 cover the replacement of the disk drive tray.

Step19 covers power on and node loading.

A brief description of software recovery actions follows the table.

Table 5-2 Drive Tray/Disk Drive Replacement Procedure

Step	Action
1	Determine if the primary or optional second disk drive is to be replaced.
2	If it is the optional second drive that is to be replaced, use the proper software command to unmount the drive (umount).
3	Perform a coprocessor software shutdown using the appropriate software command. Reference:>>*AXM System Administration* manual , Shutting down HP-UX (Section 3.5).
4	Perform an AXM node processor shutdown from the LCN AM Status display.
5	Perform a second AXM node processor shutdown from the LCN AM Status display. This makes the shutdown node appear as failed and prevents the rest of the LCN nodes from labeling it isolated.
6	Turn off power, using the switch on the AXM node power supply after the yellow indicator on the WSI2 board turns off.
7	Disconnect the SCSI interface cable from the coprocessor free edge. (It runs between the WSI2 and the drive tray above it.) It requires removal of two Phillips screws securing the cable strain relief bracket.
8	Remove the drive tray.
9	Remove the tray cover by removing three Phillips screws and eight lock nuts.
10	Remove the power connector from the drive to be replaced.
11	Remove the SCSI ribbon connector from the drive to be replaced.
12	Remove the desired disk drive by removing 4 large drive mounting screws.
13	Ensure the replacement drive is pinned correctly.
14	Mount the replacement disk drive using the same hardware that held the original drive.
15	Reconnect the drive cables removed in steps 5 and 6.

Table 5-2 Drive Tray/Disk Drive Replacement Procedure

Step	Action
16	Replace the drive tray cover removed in step 4. Be sure none of the cables are pinched between the cover and the tray at any point. Failing to do so can cause damage to the cable.
17	Insert the drive tray into the chassis.
18	Reconnect the SCSI cable disconnected in step 2.
19	The node is ready for power on and loading. Turn on the power switch located on the AXM node power supply. Reference:>> *AXM System Administration* manual (Section 3)

A coprocessor software recovery activity must be performed at this point. The work to be done differs depending on which hard drive was replaced.

If the primary drive is replaced with a spare from Honeywell logistics (formatted but no data files), the operating software is no longer available for boot purposes. This requires special procedures to boot from a local DAT drive or from a DAT drive accessed over the PIN network. A successful boot must be followed by a complete software restore from a previously customer created “Backup tape”. These procedures are found in the *AXM System Administration* manual.

If the primary drive is replaced with a primary drive from another AXM/UXS, The coprocessor will boot and assume the environment that existed in the original system. A complete software restore operation and reboot will be required to recover.

If the secondary drive is replaced, the coprocessor will boot successfully from the primary drive. The Honeywell provided spare drive is already properly formatted for use. If the replacement drive was obtained from another system (used drive), use the “mediainit” command to destroy any previous file structure that may exist on the drive prior to mounting the drive. After mounting the drive using the “mount” command, a complete software restore from a previously created “Backup tape” and reboot is required to recover.

5.13 HDDT I/O Board Replacement

Overview

Node power must be turned off for the purpose of changing circuit boards in the A^{X}M node.

> **WARNING**
>
> **Damage can result—**Circuit board damage can result if you do not practice proper ESD procedures or attempt to remove/ insert a circuit board with node power applied.

> **CAUTION**
>
> **Mandatory steps—**It is mandatory that appropriate software shutdown procedures are followed for the A^{X}M coprocessor prior to removing power from the node.
>
> Failure to do so can cause damage to the HP-UX file structure on the coprocessor hard disk.

> **ATTENTION**
>
> It is also highly recommended that you perform a node processor software shutdown when preparing to power off the A^{X}M node. This provides for an orderly departure from the LCN network.

Locating shutdown procedure

Software shutdown procedures for both the A^{X}M coprocessor and node processor are documented in the *Application Module^{X} System Administration* manual. Reference: >>*A^{X}M System Administration* manual (Section 3)

HDDT I/O Board Removal/ Replacement Procedure

Table 5-3 HDDT I/O Board Replacement Procedure

Step	Action
1	Turn off power using the switch on the node power supply.
2	Disconnect the item connected to J1 on the HDDT I/O board. This is the SCSI interface cable to the optional DAT/CD-ROM devices if they exist. It is a terminator assembly if the optional devices do not exist.
3	Remove the board by removing the two screws that secure the face plate to the chassis. Non-CE compliant HDDT I/O boards have extraction/insertion levers instead of screws.
4	Insert the replacement board. Make sure it is properly seated.
5	Reconnect the cable (or terminator assembly) onto J1 of the new HDDT I/O board. This item was removed in step 2.
6	The node is ready for power on and loading. Turn on the power switch located on the A^{X}M node power supply.
7	Perform the node loading procedures. Reference: >> *A^{X}M System Administration* manual (Section 3).

Section 6—Coprocessor Console

6.1 Overview

Requirements for coprocessor console

A console terminal connection to the coprocessor Serial Port 1 is required to initially configure the coprocessor software in PIN connected AXMs. This (terminal) will serve as a “console” to the coprocessor HP-UX software environment.

The fundamental coprocessor software configuration task is to make the AXM conversant with appropriate other nodes on the PIN (LAN). Once the communications over the PIN are established, further configuration and implementation tasks can be directed from a work station or UXS connected to the PIN.

A “console” terminal connection is normally not required after the initial PIN (LAN) configuration has been performed and a suitable work station or UXS is available on the PIN.

Troubleshooting some coprocessor related problems will require direct access with a “console” terminal for the purpose of problem isolation and recovery.

Some AXMs will be used on systems where the AXM is in a stand-alone mode. This means the AXM has a connection to the LCN, but no connection to the PIN. In this case, the coprocessor “console” terminal is needed only for troubleshooting and recovery activities. It is not envisioned that users of stand-alone AXMs will be developing solutions.

A System Administration and Development work station (HP 712/60) or UXS can be used as a console terminal. A personal computer running terminal emulator software that is compatible with the Digital Equipment Corporation (DEC) VT-100 protocol can also be used as a console terminal.

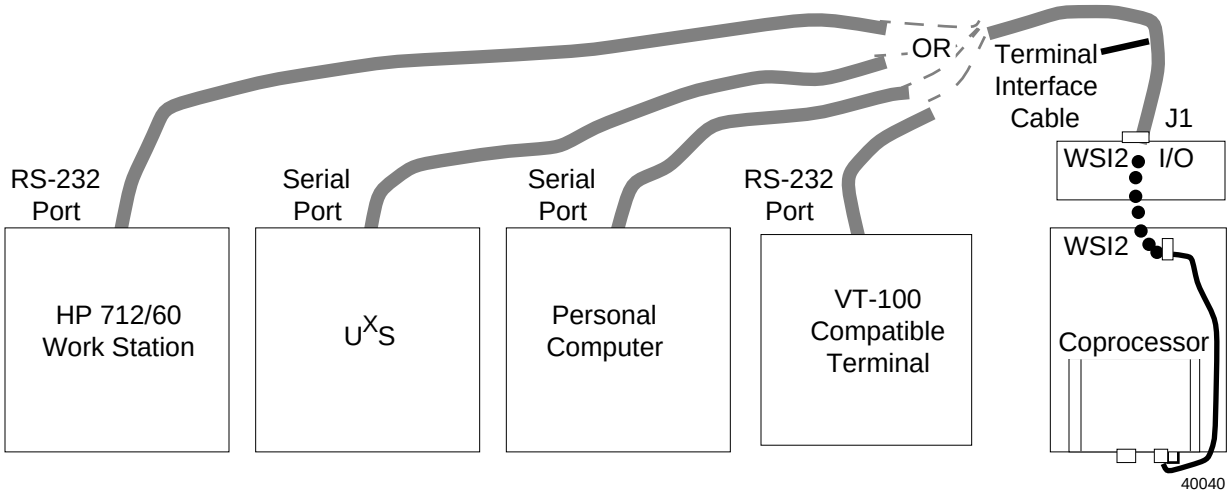
Overview of activities to be performed

There are several distinct tasks required to connect a console terminal to the coprocessor as a console.

- Select the proper terminal options.
- Connect the terminal to the WSI2 I/O board.
- The coprocessor software defaults to the proper configuration of Serial Port 1 and no coprocessor configuration actions are required.
- Apply power to the terminal.
- Ensure the terminal emulation software is activated (if using a personal computer or HP 712/60 PA-RISC workstation or U^{X}S) to perform the coprocessor console operations through serial port 1 of the A^{X}M coprocessor.
- Initiate communications using the keyboard on the terminal.

The usage of this console terminal is defined in the procedures provided in the *A^{X}M System Administration* and *A^{X}M Troubleshooting* manuals.

An illustration of a coprocessor console connection is shown below.



6.2 Coprocessor Terminal Description and Configuration

Recommended terminal

Honeywell recommends the Digital Equipment Corporation (DEC) VT-100 terminal (or any simple terminal with equivalent functionality) for use as a “console” terminal connected to the coprocessor. This terminal is needed for initial configuration of PIN connected AXMs and for troubleshooting coprocessor related problems.

A UXS or System Administration and Development workstation (HP 712/60) can be used as a coprocessor console. The serial port of these devices must be connected to the serial port of the AXM coprocessor using the provided terminal cable to support this functionality.

You may also use a PC running suitable terminal emulation software (such as Microsoft Windows Terminal) to provide compatible terminal functionality.

Required terminal options

The terminal options must be set to provide the following functionality to successfully communicate with the coprocessor serial port 1:

- Asynchronous operation
- 9600 bits per second
- 8 bits/character
- No parity

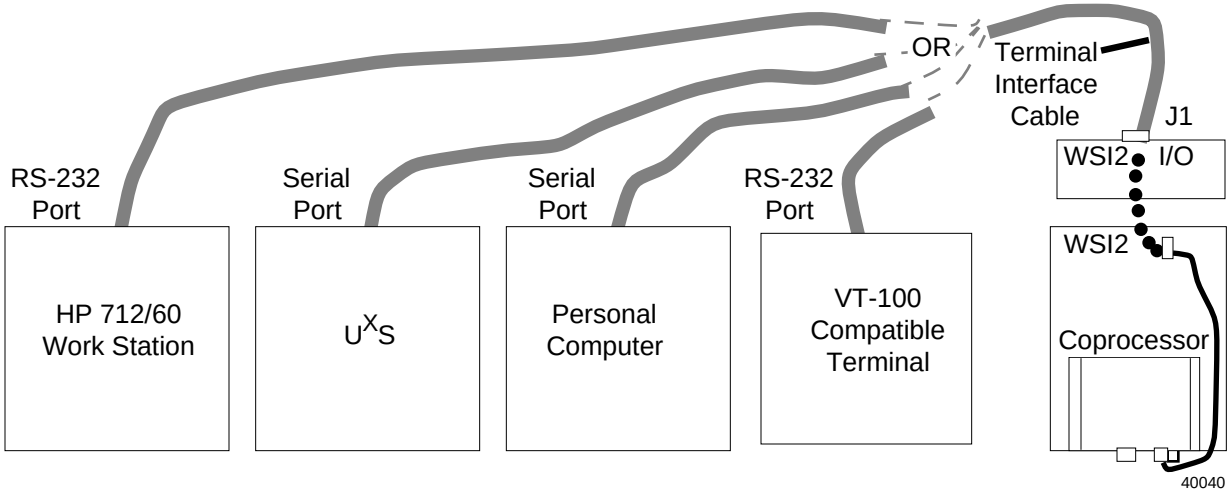
6.3 Coprocessor Console Terminal Connection

Overview

A direct connect interface cable must be connected between the coprocessor console terminal device and the WSI2 I/O board (Serial Port 1).

Several different devices can be used to provide this coprocessor console connection. The following diagram illustrates this.

Terminal connection diagram



Coprocessor console terminal interface cable schematic

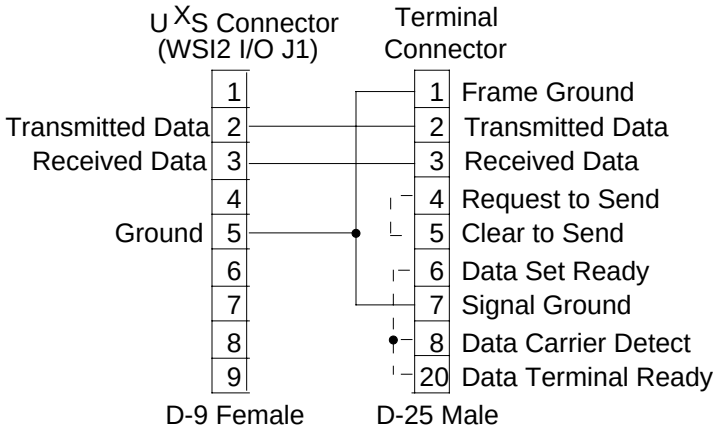
Examples of the direct connect terminal interface cable wiring details are shown in the following diagrams.

Notice that two cable types are described. One is a 9 to 25 pin direct connect cable and the other is a 9 to 9 pin direct connect cable.

The 9 to 25 pin cable (in the first diagram) is available from Honeywell logistics using the part number 51196218-300. This is an optional cable type. It is not supplied with the AXM.

The 9 to 9 pin cable (in the second diagram) is available from Honeywell logistics using the part number MP-XLLPLK. It is the cable type provided with the AXM.

9 to 25 pin cable

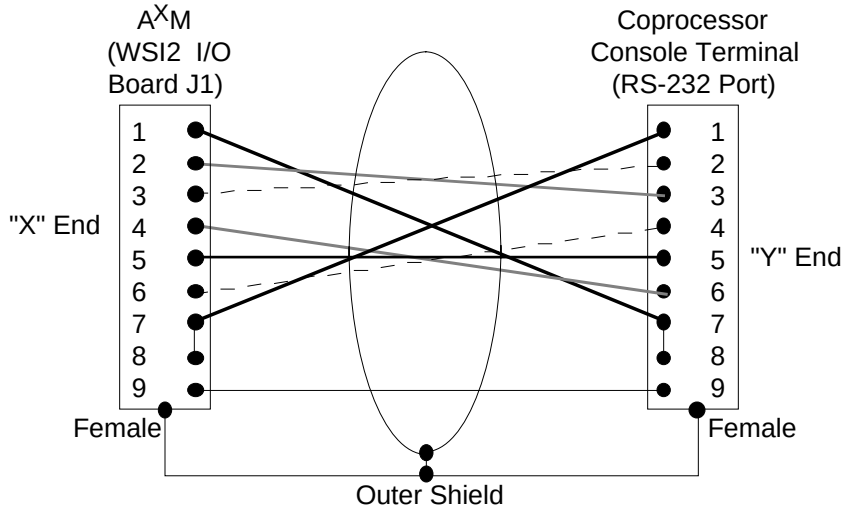


Notes:

1. Dashed connections may or may not be required by your terminal.
2. Connections on pins 2 and 3 may need to be reversed at one end and/or the D-25 may need to be a female connector, depending on the characteristics of your terminal.

40041

9 to 9 pin cable



Pinning Table

"X" End	"Y" End
1	7 & 8
2	3
3	2
4	6
5	5
6	4
7	1
8	1
9	9
Shield	Shield

40070

Note: The dashed lines shown in the 9 to 9 cable diagram above are required connections. The dashed notation for some of the connections is used to make the specific wiring easier to read on screen.

Coprocessor console terminal connection procedure

The following describes the connection details for a console terminal. The usage of this terminal is defined in procedures provided in the *AXM System Administration* and *AXM Troubleshooting* manuals.

> **CAUTION**
>
> The terminal can be connected while power is applied to the AXM and the terminal. Proper care should be exercised to ensure the cable ends do not come in contact with other electrically charged components.

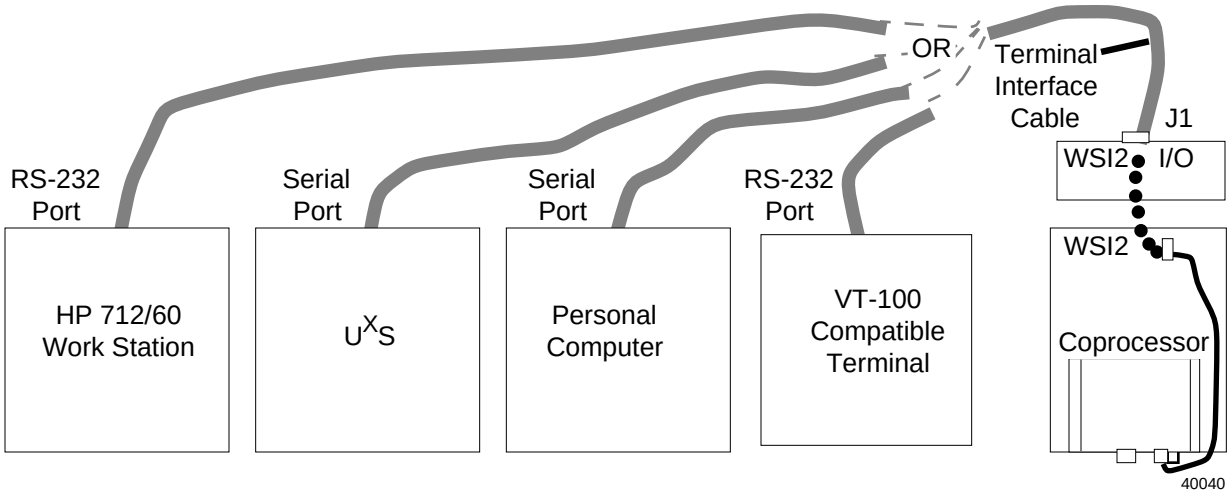
The following diagram illustrates how the different terminals would be connected as a console.

Table 6-1 Terminal Connection Procedure

Step	Action
1	Make sure the terminal is properly configured (switches/jumpers/etc.).
2	Connect the direct connect terminal interface cable to the terminal. See the diagram following this table for the proper connection (depends on which device you are using as the console terminal).
3	Connect the terminal interface cable to the WSI2 I/O board connector for Serial Port 1 (connector J1). You must disconnect the modem cable from J1 if a modem is currently connected to the AXM coprocessor.

Table 6-1 Terminal Connection Procedure (continued)

Step	Action
4	Make sure the terminal is powered on.
5	If you are using a PC as the coprocessor console, invoke the emulation software and configure it for the following characteristics: • 9600 bits/second • 8 bits/character • no parity
6	The procedure for using a VT-100 compatible terminal (simple terminal, Personal Computer, HP 712/60 workstation, or UXS) as a coprocessor console is provided in the *Application ModuleX System Administration* manual.
7	Establish communications using the terminal keyboard.
8	The activities that require the coprocessor console terminal are documented in the *AXM System Administration* manual, Reference >> AXM Setup (Section 2.3)



Note: The cable connection to the UXS is different depending on if it is Release 100 or 200 hardware. The UXS-100 connection is to the WSI I/O board J2 (normally used for printer). The UXS-200 connection is to the WSI2 I/O board J1 (normally used for UXS coprocessor console terminal).

The following table defines the different cable types available for connecting coprocessor terminals.

Table 6-2 Cable/Connector Definition for Connecting Console Terminals.

Applicable Terminal Devices	Terminal Connector	Cable Part Number
HP 712/60 Workstation	RS-232	51305069-100 9 pin(F) to 9 pin(F)
UXS-100	WSI I/O board (J2)	51305069-100 9 pin(F) to 9 pin(F)
UXS-200	WSI2 I/O board (J1)	51305069-100 9 pin(F) to 9 pin(F)
Other VT-100 compatible devices with 9 pin RS-232 connector.	Serial port	51305069-100 9 pin(F) to 9 pin(F)
Other VT-100 compatible devices with 25 pin RS-232 connector. *	Serial port	51196218-300 9 pin(F) to 25 pin(M)

* This cable is not supplied with the AXM. It is available by separate order.

Section 7—TAC Access to Coprocessor

7.1 Overview

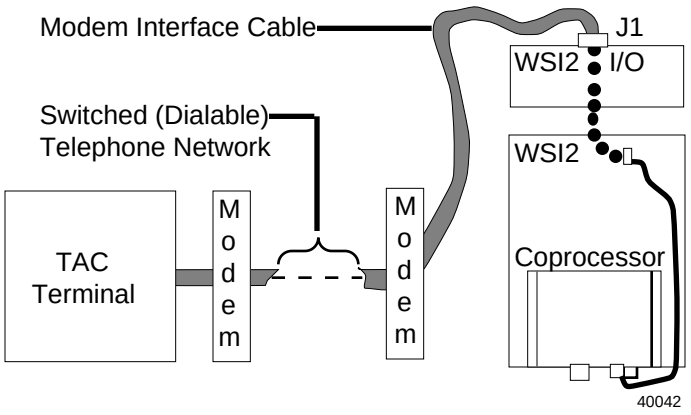
TAC support for coprocessor problems

The Technical Assistance Center (TAC) has the capability of providing assistance with troubleshooting coprocessor related problems.

Troubleshooting some problems may require direct access to the coprocessor. A telephone communications link must be connected to the coprocessor to allow direct access from TAC.

The diagram right illustrates this communications link.

TAC connection illustration



Overview of activities to enable TAC access

There are several distinct tasks required to establish the TAC communications link to the coprocessor.

- Configure the modem options using switches and internal registers.
- Connect the modem to the WSI2 I/O board.
- Connect the modem to a switched (dialable) telephone line.
- The coprocessor software defaults to the proper configuration of Serial Port 1 and no coprocessor configuration actions are required.
- Apply power to the modem.
- Establish the telephone connection with TAC under direction of the TAC engineer.

7.2 Communications Modem Description and Configuration

Recommended modem

Honeywell recommends the following modem for the TAC access communications link.

U.S. Robotics Sportster 9600

This is a commercially available device and is not supplied by Honeywell. The configuration switches and registers for this modem are given later in this section.

Other modems that are fully compatible with the U. S. Robotics Sportster 9600 and its configuration may work.

The proper functionality of the communications link to TAC must be verified at the time of AXM hardware installation. Failing to do so can drastically effect the availability/efficiency of TAC support when it is needed.

Modem configuration switches

Some of the modem functionality is determined by setting configuration switches.

The following table identifies the required setting of the modem switches to make it function as a TAC access modem.

Table 7-1 U.S. Robotics 9600 Configuration Switch Positions

Switch	Position	Description
1	DOWN	DTR override
2	DOWN	Verbal result codes
3	UP	Suppress result codes
4	DOWN	No echo, offline commands
5	UP	Auto Answer on ring
6	DOWN	Carrier detect override
7	UP	Load NVRAM defaults
8	DOWN	Smart mode

Modem Configuration Registers

The internal configuration registers of the U.S. Robotics Sportster 9600 modem must be properly loaded to finish the modem configuration task. This is done by connecting a terminal to the modem and then entering the required configuration data into the registers.

The configuration data for the U.S. Robotics 9600 modem is provided in a table following in this section.

Once the registers are configured, the modem registers will retain the information. This information is retained even if power is turned off and on again.

Terminal requirements for setting modem configuration registers

The terminal used for setting the internal configuration registers of the U.S. Robotics 9600 modem must have the following configuration characteristics:

- Asynchronous operation
- 9600 baud rate
- 8 bits/no parity character format

Required modem configuration register data

The following table contains the required configuration register data to make it support the TAC access connection.

Table 7-2 U.S. Robotics 9600 Configuration Register Data

Register	Description
B0	Needed to answer above 4800
E0	Local echo off
F1	Local echo of transmitted data off (full duplex)
M1	Speaker on until carrier established
Q1	Result codes suppressed
V0	Numeric result codes
X0	Result code messages (min)
&A0	Disable additional ARQ result codes
&B1	Serial port remains fixed at last AT command (during configuration of the modem)
&C0	CD override
&D0	Coprocessor must set DTR before modem will accept commands
&G0	No guard tone
&H1	Hardware flow control
&I0	Flow control disabled
&K1	Auto data compression enabled
&M0	Normal mode, error control disabled

Table 7-2 U.S. Robotics 9600 Configuration Register Data (continued)

Register	Description
&N0	Variable link operations
&P0	Pulse dialing US/Canada
&R1	Ignore RTS
&S0	DSR override
&T5	Prohibit RDL
&Y1	Break handling, destructive expedited

> **CAUTION**
>
> Be certain to perform a save/write (AT&W) to NVRAM registers after entering the register data.

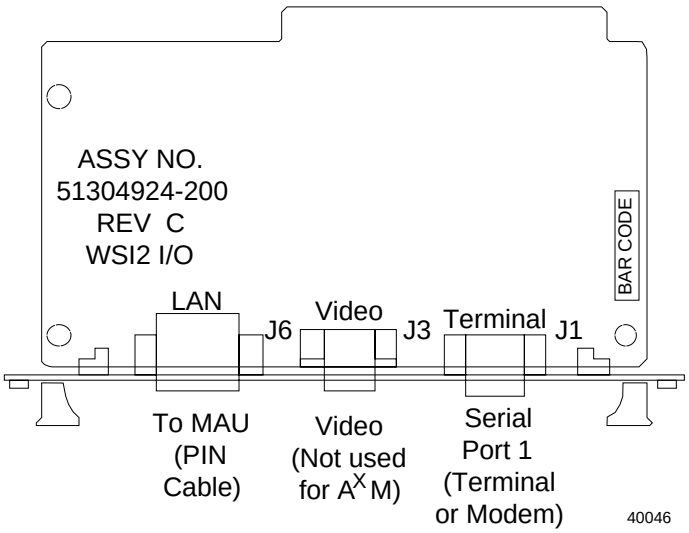
Modem register configuration procedure

The procedure for configuring the U.S. Robotics Sportster 9600 registers is defined in the product manual supplied from the manufacturer with the modem.

7.3 Modem Connection

Overview

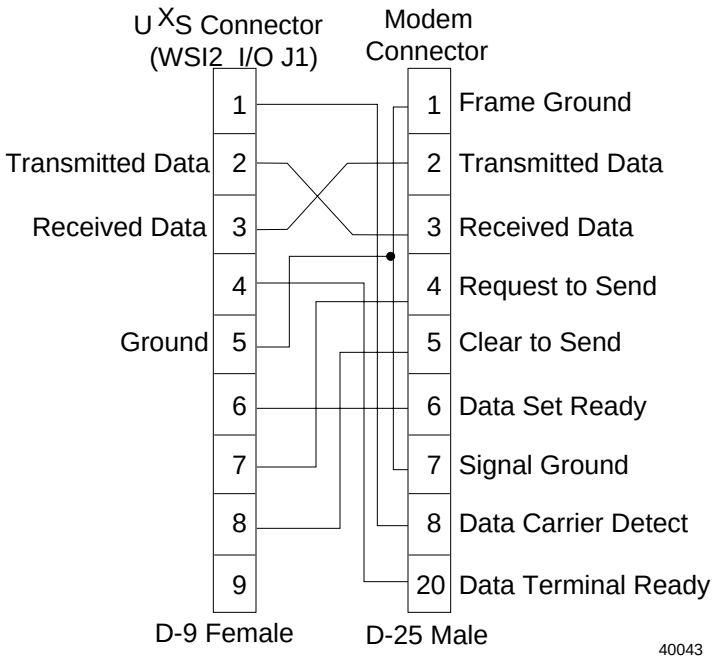
An interface cable must be connected between the optional modem and the WSI2 I/O board J1 (Serial Port 1). Locate J1 in the diagram on the right.



Modem interface cable schematic

An example of the modem interface cable internal wiring details are shown in the diagram.

This cable is available from Honeywell logistics with the part number 51305073-100. It must be ordered separately.



Modem connection procedure for U.S. Robotics Sportster 9600

> **CAUTION**
>
> The modem can be connected while power is applied to the AXM and the modem. Proper care should be exercised to ensure the cable ends do not come in contact with other electrically charged components.

Table 7-3 Modem Connection Procedure

Step	Action
1	Make sure the modem is properly configured (switches and internal configuration registers).
2	Connect one end of the modem interface cable to the modem.
3	Connect the other end of the modem interface cable to the WSI2 I/O board for serial Serial Port 1 (connector J1). You will have to disconnect the coprocessor console terminal cable from this jack if the terminal is currently connected.
4	Make sure the telephone connection to the modem is properly made.

Table 7-3 Modem Connection Procedure (continued)

Step	Action
5	Ensure modem power is on.
6	The communications link hardware is ready for making the telephone connection and subsequent sign-on by TAC.

Section 8—HP 712/60 PA RISC Desktop Workstation

8.1 HP 712/60 Workstation in A^{X}M Environment

Overview of HP 712/60 workstation functionality supporting A^{X}M

The optional System Administration and Development workstation (HP 712/60) provides several functions that support the A^{X}M environment. They are:

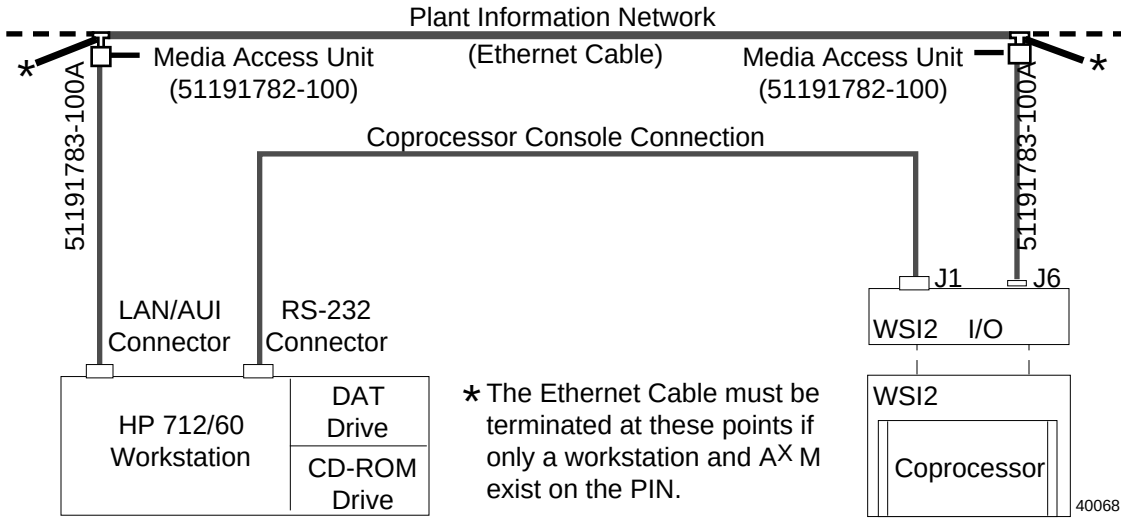
- Provides an HP-UX workstation connected to the PIN (LAN). A^{X}M system administration and application development can be accomplished through this PIN connection.
- Can be used as a coprocessor console terminal for the purposes of initial A^{X}M coprocessor configuration and coprocessor troubleshooting when the need arises. This is done through the RS232 (serial port) connector of the workstation.
- Provides a DAT tape drive accessible over the PIN. A DAT drive is required to support A^{X}M hard drive save/restore activities. Some A^{X}Ms may have their own directly connected DAT drive (optional). The DAT drive also supports installation of optional software and software upgrade activities.
- Provides a CD-ROM reader accessible from the PIN. Some A^{X}Ms may have their own directly connected CD-ROM (optional). It provides access to the HP-UX documentation (online).

This optional workstation is not required if the customer has alternative means to accomplish the functions mentioned above (i.e., has a combination of U^{X}S/ HP-UX workstations/simple terminals/etc.)

The following diagram illustrates how the optional workstation is connected.

HP 712/60 workstation connection

The following diagram illustrates the connections required to provide all of the AXM support functionality as described earlier in this section.



Coprocessor console interface cable

The cable required to make the coprocessor console connection between the HP712/60 workstation and the AXM is an RS-232 direct connect cable. It is provided with the AXM. See the Coprocessor Console Terminal Connection section of this manual for the part number and additional details, if required.

HP 712/60 workstation documentation

The HP 712/60 PA RISC workstation is a standard product of the Hewlett Packard company. The supporting documentation is provided with the product as it ships from their factory.

HP 712/60 workstation technical support

Technical support services for this product are handled through the Honeywell Technical Assistance Center (TAC). The toll free number within the United States is (800) 822-7673. For calls within Arizona, the number is (602) 313-5558.

HP 712/60 workstation spare parts

Repair services and spare parts for the HP 712/60 workstation are supplied through the Honeywell Field Service Organization.

Section 9—DAT DRIVE

Introduction

DAT drive purpose

A directly connected Digital Audio Tape (DAT) drive is an optional feature for the A^{X}M. It provides the capability to perform software “Backup” and “Restore” operations without a communication connection over the PIN network. It may also be used for software installation and software updates.

This locally connected DAT tape can also be utilized to recover from a catastrophic failure of the coprocessor primary hard drive.

The maximum capacity of the DAT tape media is 2 gigabytes.

DAT drive location

This optional device is available only if the A^{X}M node is mounted in TDC 3000^{X} console furniture which has sufficient available space to accommodate a DAT drive in the removable media tray (two devices maximum per station).

Cartridge drives for the LCN and DAT drive for the possible U^{X}S in the same furniture will also require space in the removable media trays of a system console (cluster of stations). A table top cabinet adjacent to the station with a slide tray for removable media is also available.

Operation and media handling

The procedures for operating the DAT tape drive and media handling precautions are given in the vendor-provided users brochure that is supplied with the equipment.

ATTENTION

The DAT tape cassettes are a high-density storage medium that are sensitive to dirt, dust, magnetism and humidity.

Be sure to read the media handling brochure provided with the equipment.

Spare Parts

The spare parts list for the DAT drive and associated parts is provided in the last section of this document.

9.1 DAT Drive Indicators

DAT indicator definition

The DAT drive front panel has two bicolored indicators (left and right). The two colors are green and amber. Green is used to indicate normal conditions, whereas amber is used to indicate that operator intervention is required or that an error has occurred. The table below identifies the possible indicator patterns and the associated definitions.

Table 9-1 DAT Drive Indicator Definitions

State	Left	Right	Definition
Read/Write	Green Blinking	Green Blinking	Cassette (Un)Loading
	Green On	Green On	Cassette Loaded/ Online
	Green On	Green Blinking	Cassette Loaded/ Activity
	Green On	Off	Cassette Loaded/ OffLine
Write-Protect	Amber Blinking	Green On	Cassette (Un)Loading
	Amber On	Green On	Cassette Loaded/ Online
	Amber On	Green Blinking	Cassette Loaded/ Activity
	Amber On	Off	Cassette Loaded/ OffLine
Error	Green On	Green/Amber Blinking	Media Wear (Caution - dirty head, bad tape, or worn head)
	Amber On	Amber On	High Humidity or No termination on SCSI Interface
	Amber Blinking	Amber Blinking	Cassette Loaded/ Activity
	Amber Blinking	Amber On	Self-Test (failure)

9.2 Preventive Maintenance

DAT head cleaning

The DAT drive heads require cleaning:

- after every 28 hours of actual operation.
- when the “Caution” indicator status on front of the drive is displayed. See the table above for details.

Head cleaning procedure

The following table provides the procedure for using the DAT cleaning cassette. This cassette is available from Honeywell logistics under the number 51196257-200 (HP 92283K).

Table 9-2 DAT Drive Head Cleaning Procedure

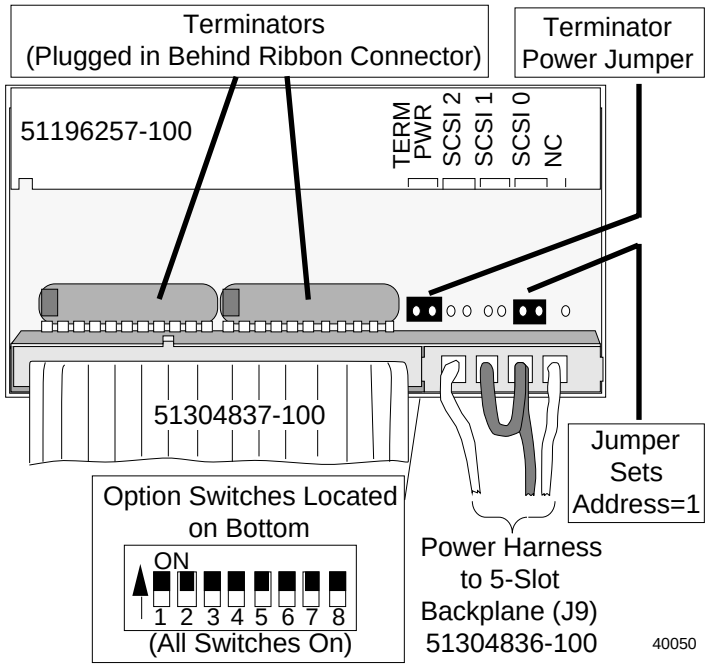
Step	Action
1	Insert the cleaning cassette into the drive.
2	The drive will automatically load the cassette and clean the heads.
3	The drive will automatically eject the cassette when the cleaning cycle is complete.
4	Update the usage count on the label of the cleaning cassette.
5	Discard the cleaning cassette after 28 uses; it is worn out at that point.

9.3 DAT Drive Physical Configuration and Cabling

DAT SCSI address pinning

The SCSI address for the DAT drive must be pinned for an address of 1. The pinning is done in binary fashion as shown at the bottom right of the following diagram.

This SCSI address pinning must be checked, and corrected if necessary, when installing a DAT drive as a new option or a replacement drive.



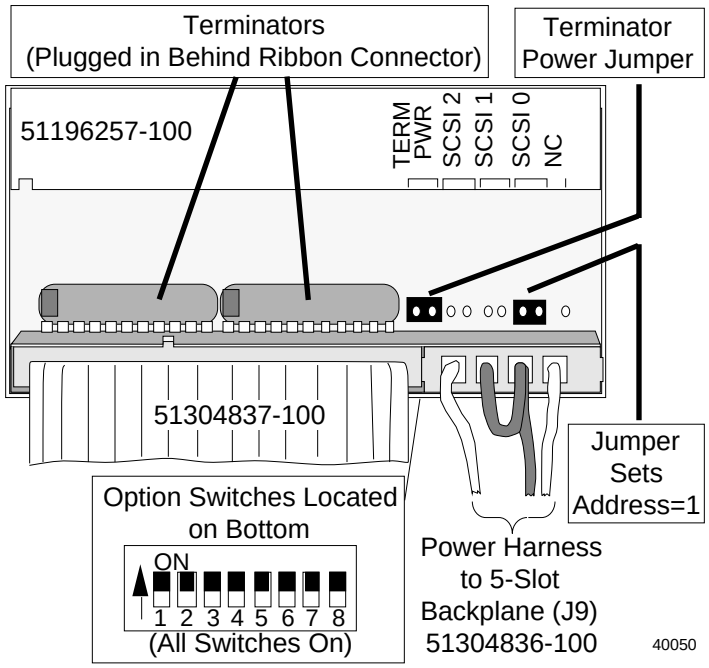
DAT SCSI interface termination

The termination for the coprocessor SCSI bus must be provided by the device at the end of the cable when external peripherals are connected to the coprocessor. The DAT drive will always be at the end of the SCSI cable if a DAT exists.

The terminator assemblies that provide this function within the DAT drive are mounted immediately above the SCSI interface cable connection. See the identified terminator assemblies on the following diagram.

A power jumper at the bottom right is required to provide power for the terminator assemblies. See the terminator power jumper in the diagram.

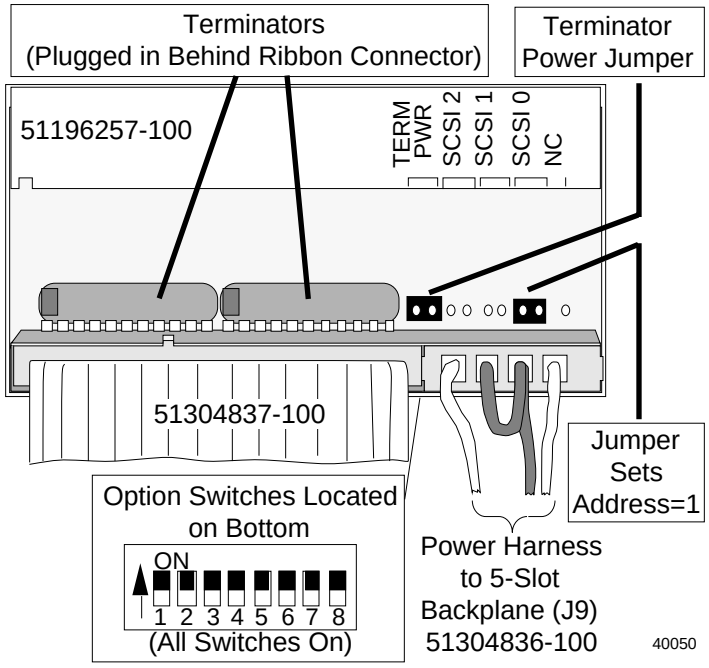
These SCSI interface terminators and power jumper must be checked, and added if necessary, when installing a DAT drive as a new option or a replacement drive.



DAT option switches

Internal DAT drive options are selected by 8 switches located on the bottom of the drive. The connection of the DAT drive to the AXM requires that these switches all be placed in the ON position. See the following diagram.

These switches must be checked, and turned on if necessary, when installing a DAT drive as a new option or a replacement drive.



DAT drive cabling

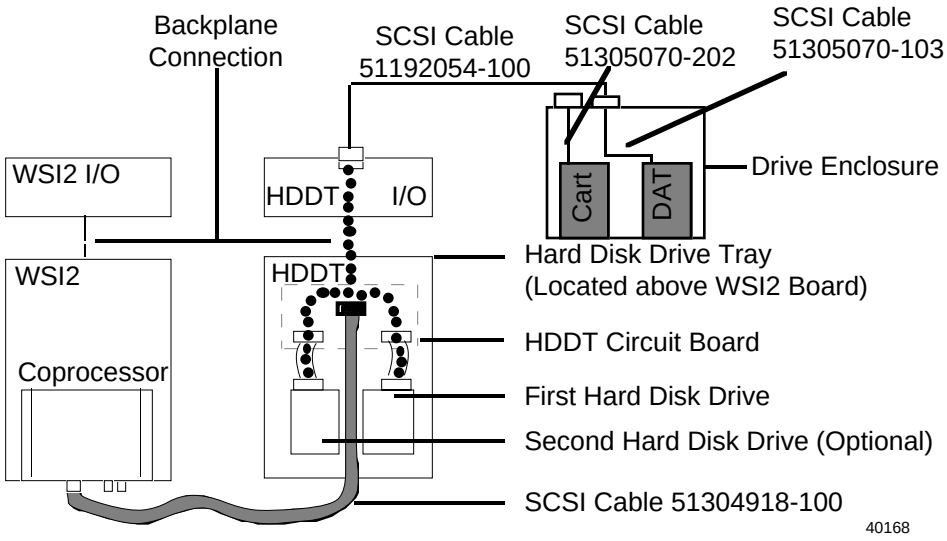
The optional DAT drive connection may coexist with an optional CD-ROM drive connection to the coprocessor.

The possible SCSI interface cable connection schemes are illustrated in the following two diagrams.

The device connected to the far end of the cable (multidrop) must be the device that provides the SCSI interface termination.

DAT connection (no CD-ROM)

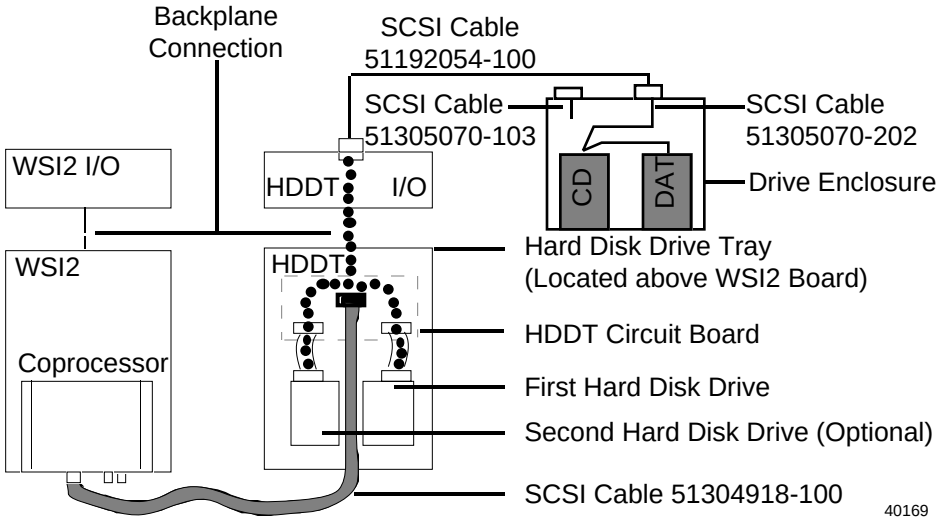
The following diagram illustrates the SCSI cable connection for an optional AXM connected DAT drive without an optional AXM connected CD-ROM. Notice that the optional AXM connected DAT drive shares the common Universal Station drive enclosure. The cartridge drive shown would be connected to the US node in the common station furniture.



DAT connection (with CD-ROM)

The following diagram illustrates the SCSI cable connections for both an optional AXM connected DAT and optional AXM connected CD-ROM drive.

Notice that the optional AXM connected drives consume the entire drive enclosure (both drive positions). The US node in the common station furniture would not be able to have a cartridge drive in this case.



9.4 DAT Replacement

Overview

Node power must be turned off for the purpose of changing circuit boards in the AXM node.

> **WARNING**
>
> **Damage can result—**Circuit board damage can result if you do not practice proper ESD procedures or attempt to remove/ insert a circuit board with node power applied.

> **CAUTION**
>
> **Mandatory steps—**It is mandatory that appropriate software shutdown procedures are followed for the AXM coprocessor prior to removing power from the node.
>
> Failure to do so can cause damage to the HP-UX file structure on the coprocessor hard disk.

> **ATTENTION**
>
> It is also highly recommended that you perform a node processor software shutdown when preparing to power off the AXM node. This provides for an orderly departure from the LCN network.

Locating shutdown procedure

Software shutdown procedures for both the AXM coprocessor and node processor are documented in the Application ModuleX System Administration manual.

Replacement procedure

The following procedure outlines the steps that are required to replace a DAT drive.

Table 9-3 DAT Replacement Procedure

Step	Action
1	Perform an orderly shutdown of the coprocessor HP-UX software.
2	Perform an orderly shutdown of the AXM node processor using the Node Status display. This includes performing a checkpoint save, if required.
3	Power off the AXM node power supply.
4	Remove the appropriate console furniture components to allow access to the DAT device. Access is from the rear for Classic console furniture and from the front for Ergonomic console furniture.

Table 9-3 DAT Replacement Procedure (continued)

Step	Action
5	Remove the power connector from the rear of the device.
6	Remove SCSI interface cable from the rear of the device.
7	Remove the drive from its mounting hardware.
8	Check that the SCSI address for the new drive is pinned for address 1. Compare to the old drive, if required.
9	Check that the SCSI terminator power pinning is correct (enabled) in the new drive.
10	Check for the presence of the SCSI terminator assemblies in the new drive.
11	Check that all eight option switches on the bottom of the drive are ON.
12	Install the new drive into its mounting on the station removable media tray.
13	Connect the SCSI interface cable to the rear of the drive (removed in Step 6).
14	Connect the power connector to the rear of the drive (removed in Step 5).
15	Power on the A^{X}M node power supply.
16	Allow sufficient time for the HP-UX software to boot (yellow indicator on WSI2 board comes on).
17	Load the A^{X}M node personality using the “Autoload Net” target on the Node Status display.
18	The DAT drive is now ready for checkout using normal HP-UX tools. Suggest using the tools provided under the HP-UX “xstm” command. Reference the Man Page online feature or HP-UX documentation for additional information on the “xstm” command.

Section 10—CD-ROM Drive

10.1 Introduction

CD-ROM purpose

A directly connected CD-ROM drive is an optional feature for the A^{X}M. It provides the capability to access HP software documentation.

Future uses may include installing software and software updates.

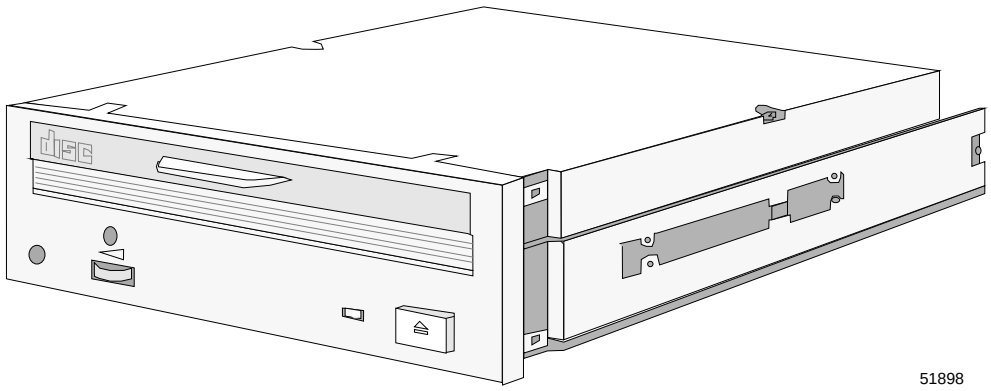
CD-ROM drive location

This optional device is available only if the A^{X}M node is mounted in TDC 3000^{X} console furniture (station) which has sufficient available space to accommodate a DAT drive in the removable media tray (two devices maximum).

Cartridge drives for the LCN and DAT drives for the A^{X}M and U^{X}Swill also require space in the removable media trays of a system console (cluster of stations). A table top cabinet (immediately adjacent to the station) with a slide tray for removable media is also available.

Physical drive

The following illustration shows the front view of the CD-ROM drive. The button at the left is a power on/off switch and the control on the right is the media eject button. A nonfunctional audio output jack and volume control are located at the bottom center. The software does not support the audio feature.



Operation and media handling

The procedures for operating the CD-ROM drive and media handling instructions are given in the vendor-provided users brochure that is supplied with the equipment.

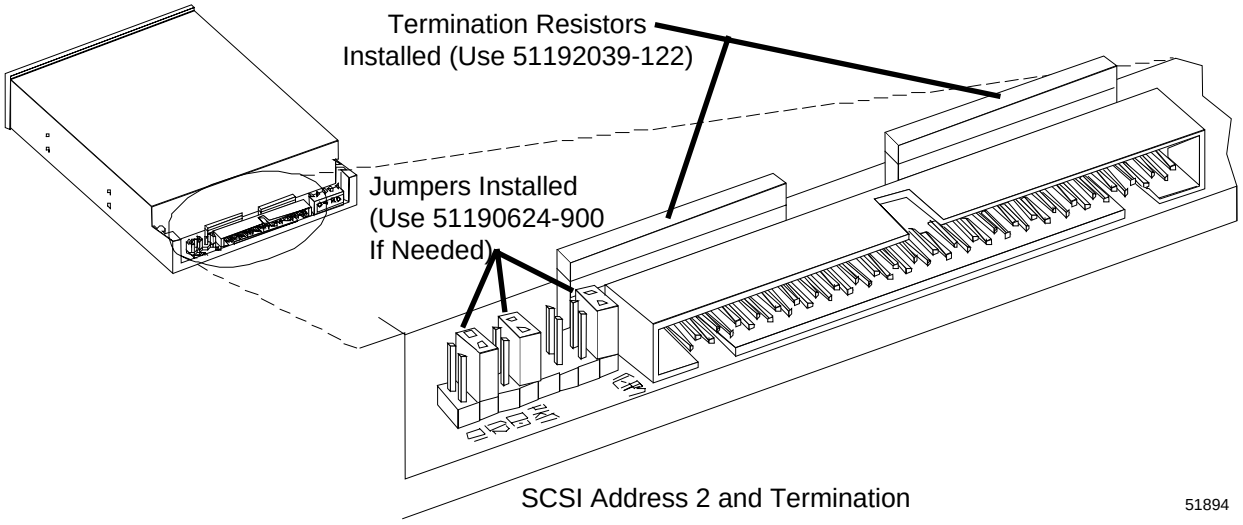
Spare parts

The spare parts list for the CD-ROM drive and associated parts is provided in the last section of this document.

10.2 CD-ROM Physical Configuration and Cabling

CD-ROM pinning (without DAT drive)

The SCSI interface must be terminated by placing termination resistor assemblies at the drive located at the end of the cable (farthest from HDDT I/O board). The following illustration shows the proper pinning (device address 2) and terminators for the CD-ROM when the configuration does not include a DAT drive.

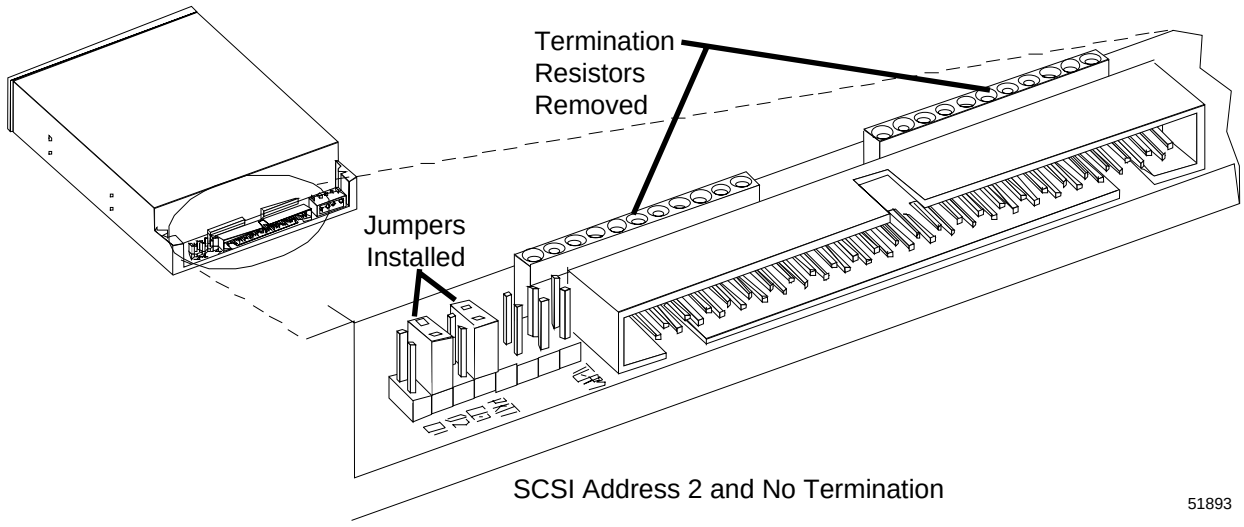


SCSI Address 2 and Termination

51894

CD-ROM pinning (with DAT drive)

The SCSI interface must be terminated by placing termination resistor assemblies at the drive located at the end of the cable (farthest from HDDT I/O board). The following illustration shows the proper pinning (device address 2) and terminators for the CD-ROM when the configuration includes a DAT drive.



SCSI Address 2 and No Termination

51893

CD-ROM power

Power to the CD-ROM drive is supplied by the AXM node power supply. This is done through a wire harness connected to J9 on the rear of the AXM node backplane.

CD-ROM drive SCSI cabling

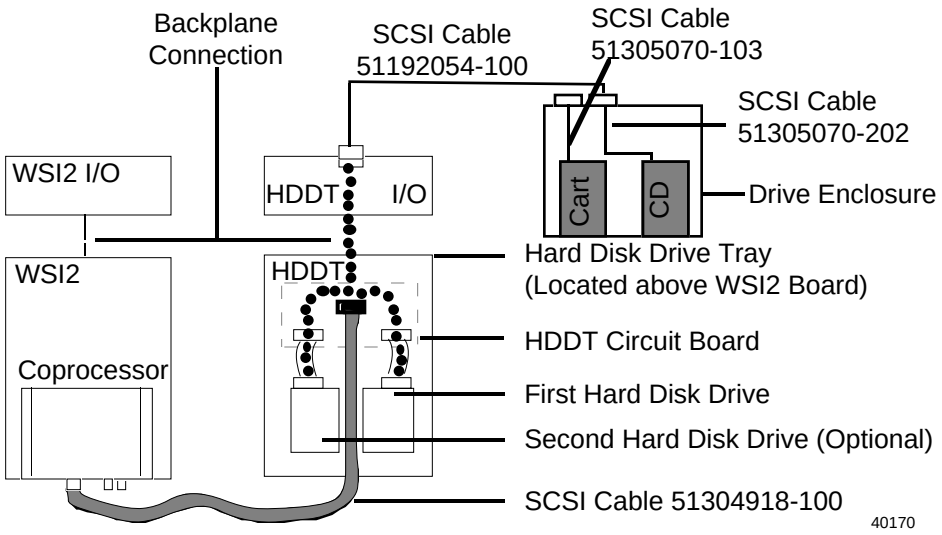
The optional CD-ROM drive connection may coexist with an optional DAT drive connection to the coprocessor.

The possible SCSI interface cable connection schemes are illustrated in the following two diagrams.

The device connected to the far end of the cable (daisy chain) must be the device that provides the SCSI interface termination.

CD-ROM connection (no DAT)

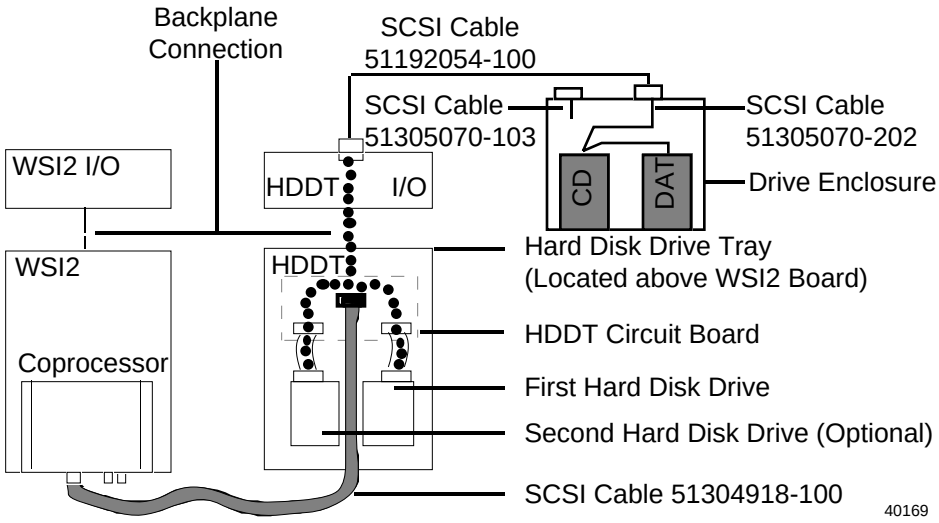
The following diagram illustrates the SCSI cable connection for an optional AXM connected CD-ROM drive without an optional AXM connected DAT drive. Notice the AXM connected CD-ROM shares the common Universal Station drive enclosure. In this case, the AXM connected CD-ROM must have the termination resistor assemblies present to provide the SCSI interface termination. The cartridge drive shown would be connected to the US node in the common station furniture.



CD-ROM connection (with DAT drive)

The following diagram illustrates the SCSI cable connections for an optional A^{X}M connected CD-ROM drive coexisting with an otional A^{X}M connected DAT drive. In this case, the CD-ROM must not have the termination resistors present. The DAT drive will provide the SCSI interface termination.

Notice that the optional A^{X}M connected drives consume the entire drive enclosure (both drive positions). The US node in the common station furniture would not be able to have a cartridge drive in this case.



10.3 CD-ROM Replacement

Overview

Node power must be turned off for the purpose of changing circuit boards in the AXM node.

> **WARNING**
>
> **Damage can result—**Circuit board damage can result if you do not practice proper ESD procedures or attempt to remove/ insert a circuit board with node power applied.

> **CAUTION**
>
> **Mandatory steps—**It is mandatory that appropriate software shutdown procedures are followed for the AXM coprocessor prior to removing power from the node.
>
> Failure to do so can cause damage to the HP-UX file structure on the coprocessor hard disk.

> **ATTENTION**
>
> It is also highly recommended that you perform a node processor software shutdown when preparing to power off the AXM node. This provides for an orderly departure from the LCN network.

Locating shutdown procedure

Software shutdown procedures for both the AXM coprocessor and node processor are documented in the Application ModuleX System Administration manual.

Replacement procedure

The following procedure outlines the steps that are required to replace a CD-ROM drive.

Table 10-1 CD-ROM Replacement Procedure

Step	Action
1	Perform an orderly shutdown of the coprocessor HP-UX software using the shutdown command.
2	Perform an orderly shutdown of the AXM node processor using the Node Status display. This includes performing a checkpoint save, if required.
3	Power off the AXM node power supply.
4	Remove the appropriate console furniture components to allow access to the CD-ROM device. Access is from the rear for Classic console furniture and from the front for Ergonomic console furniture.

Table 10-1 CD-ROM Replacement Procedure (continued)

Step	Action
5	Remove the power connector from the rear of the device.
6	Remove SCSI interface cable from the rear of the device.
7	Remove the drive from its mounting hardware.
8	Check that the new drive pinning and SCSI terminators are correct. Compare to the old drive, if required. (Note that there is a difference with and without the DAT drive.)
9	Install the new drive into its mounting in the station removable media tray.
10	Connect the SCSI interface cable to the rear of the drive (removed in Step 6).
11	Connect the power connector to the rear of the drive (removed in Step 5).
12	Power on the AXM node power supply.
13	Allow sufficient time for the HP-UX software to boot (yellow indicator on WSI2 board comes on).
14	Load the AXM node personality using the “Autoload Net” target on the Node Status display.
15	The new CD-ROM drive is now ready for checkout using normal HP-UX tools. Suggest using the tools provided under the HP-UX “xstm” command. Reference the Man Page online feature or HP-UX documentation for additional information on the “xstm” command.

Section 11—Spare Parts

11.1 Overview

Organization of this section

This section lists the field replaceable parts for both versions of A^{X}M node hardware.

It is divided into the following categories:

- Basic 5-Slot Module (does not include circuit boards).
- Basic 10-Slot Module (does not include circuit boards).
- Node processor related boards
- WSI2 (coprocessor)
- Hard Disk Drive Tray (includes disk drives)
- DAT drive (optional feature)
- CD-ROM drive (optional feature)

CE compliant/non-compliant hardware

Both CE compliant and initial non-CE compliant A^{X}M hardware exists in the field. Spare parts differences exist between these versions. It is mandatory that the user of this parts section be aware of the specific A^{X}M node hardware version when ordering parts.

It is conceivable that multiple A^{X}Ms with different hardware versions (compliant/non-compliant) can exist on the same system if later A^{X}M upgrades are added to systems that had early A^{X}M hardware.

The easy way to recognize a CE compliant node is that the I/O boards are bolted into the chassis and have no extraction/insertion levers.

Non-CE compliant nodes have I/O boards with extraction/insertion levers.

New technology

The Hewlett Packard corporation continuously upgrades their product and Honeywell will follow suit. New parts and technology will be made available as old parts become obsolete.

This evolution to newer technology will be most prevelent in the area of hard disks drives and coprocessor memory daughter boards. New vendors and capacities will be phased in as needed to support the evolving A^{X}M requirements and to accomodate the evolving technology of our suppliers.

11.2 Basic 5-Slot Module Parts

Basic 5-slot parts list

The table on the following page identifies the basic parts for an AXM node in a 5-slot chassis.

Table 11-1 5-Slot Module Parts List for Normal Production Units

Assembly Number	Description
CE compliant 51196692-100	Five-Slot Module assembly (card file) for use in classic furniture or rack-mounted applications
Non-CE compliant 51195499-100	
CE compliant 51196729-100	Five-Slot Module assembly (card file) for use in ergonomic furniture
Non-CE compliant 51197068-100	
51400646-100	Five-Slot Module fan assembly
51400918-100	Module cover (classic furniture or rack-mounted)
CE compliant 51305293-100	Module cover (ergonomic furniture)
Non-CE compliant 51401486-100	
51400646-100	Module fan assembly
CE compliant 51196653-100	Five-Slot Module power supply
Non-CE compliant 51195066-100	
CE-compliant 51308093-300	Power cord 120 V 50/60 Hz (classic furniture)
Non-CE compliant 51303508-100	
CE compliant 51308094-300	Power cord 220 V 50/60 Hz (classic furniture)
Non-CE compliant 51303508-200	
CE compliant 51308092	Power cord 120V/220V 50/60 Hz (ergonomic furniture)
Non -CE compliant 51308019-200	Power cord 120 V 50/60 Hz (ergonomic furniture)

Table 11-1 5-Slot Module Parts List for Normal Production Units

Assembly Number	Description
Non-CE compliant 51308066-200	Power cord 220 V 50/60 Hz (ergonomic furniture)
51305282-100	Empty card slot filler plate (used in CE compliant notes only)

11.3 Basic 10-Slot Module Parts

Basic 10-slot parts list

The following table identifies the basic parts for an AXM node in a 10-slot chassis.

Table 11-2 Basic 10-Slot Module Parts List for Normal Production Units

Assembly Number	Description
CE compliant 51196736-100	10-Slot Module assembly (card file) for rack mounting or classic furniture.
Non-CE compliant 51108893-100	
51400647-100	10-Slot Module fan assembly
51400919-100	10-Slot Module cover assembly
CE compliant 51196654-100	10-Slot Module power supply
Non-CE compliant 51195066-200	
CE compliant 51308093-300	Power cord 120 V 50/60 Hz
Non-CE compliant 51303508-100	
CE compliant 51308094-300	Power cord 220 V 50/60 Hz
Non-CE compliant 51303508-200	
51305282-100	Empty card slot filler plate (used in CE compliant notes only)

11.4 LCN Node Processor Parts

Node processor parts list

The following table provides the part numbers for the Node processor components.

LCN Node Processor Related boards Parts List

Assembly Number	Description
51401551-801	K2LCN (with 8 megawords of on-board memory.)
51401551-401	K2LCN (with 4 megawords of on-board memory.)
51400978-100	HMPU (node processor board)
51401072-200	QMEM-2 (additional memory for HMPU)
51401072-400	QMEM-4 (additional memory for HMPU)
51401291-100	LLCN Board
CE compliant 51305072-100	CLCN A/B Board (provides LCN connection)
Non-CE compliant 51107403-100	LCN I/O Board (provides LCN connection)

11.5 Coprocessor and Related Parts

WSI2 and WSI2 I/O

Table 11-3 WSI2 and WSI2 I/O Boards

Assembly Number	Description
51402083-100	WSI2 Board, includes 64 MHz coprocessor **with no memory** (requires the appropriate coprocessor memory daughter boards—ordered separately).
51402083-200	WSI2 Board, includes 100 MHz coprocessor **with no memory** (requires the appropriate coprocessor memory daughter boards—ordered separately).
CE compliant 51304924-200	WSI2 I/O Board
Non-CE compliant 51304924-100	

Coprocessor memory and battery

The following page contains a table which provides the part numbers for the optional sizes of coprocessor memory and the coprocessor battery

.

ATTENTION

Two methods of providing the 32 megabyte and 64 megabyte memory are used depending on memory board availability at the time of manufacture. The possible memory configurations are as follows.

- 32 megabyte -- provided by two 16 megabyte memory daughter boards
- 32 megabyte -- provided by one 32 megabyte memory daughter board
- 64megabyte --provided by two 32 megabyte memory daughter boards
- 64 megabyte -- provided by one 64 megabyte memory daughter board
- 128 megabyte -- provided by two 64 megabyte memory daughter boards
- 256 megabyte -- provided by four 64 megabyte memory daughter boards

The optional coprocessor memory sizes and coprocessor battery part numbers are listed below.

Table 11-4 Coprocessor Memory Boards and Battery

Assembly Number	Description
51196418-300 (order quantity of 2)	16 megabyte coprocessor memory daughter board.
51196418-301 (order quantity of 2 for 64 megabytes)	32 megabyte coprocessor memory daughter board.
51196418-302 (order quantity of 2 for 128 megabytes) (order a quantity of 4 for 256 megabytes)	64 megabyte coprocessor memory daughter board.
51196418-400	Time of day clock battery (on coprocessor daughter board, which is part of the WSI2 board).

Coprocessor PIN connection hardware

Table 11-5 PIN Connection Hardware

Assembly Number	Description
51191783-100	PIN (LAN) interface cable [between WSI2 I/O and the Media Access Unit]
51191782-100	Media Access Unit (MAU) [connects to the PIN (LAN) cable network]

Coprocessor console terminal/ modem cables

Table 11-6 Coprocessor Console Terminal/Modem Interface Cables

Assembly Number	Description
51305069-100	Serial Port interface cable (for connecting coprocessor console terminal with 9-pin RS-232 connector). Supplied with initial A^{X}M through the MP-XLLPLK model number.
51196218-300	Optional Serial Port interface cable (for connecting coprocessor console terminal with 25-pin RS-232 connector). Not supplied with A^{X}M.
51305073-100	Serial Port interface cable (for connecting TAC access modem with 25-pin RS-232 connector). Must be ordered separately.

11.6 Hard Disk Drive Tray and Drive Parts

Tray and drive parts list

The following table provides the part numbers for the Hard Disk Drive Tray and the disk drives.

Table 11-7 Drive Tray and Related Parts List

Assembly Number	Description
51402176-100	Hard Disk Drive Tray (includes internal circuit board and drive cables. Does not include disk drives—ordered separately)
51196433-100	525 Megabyte Hard Disk Drive (applicable for primary and second drive)
51196432-100	1.2 Gigabyte Hard Disk Drive (applicable for primary and second drive)
51196479-100	2 Gigabyte Hard Disk Drive (applicable for primary and second drive)
51304921-100	Disk drive power cable/harness (inside HDDT)
51304918-100	SCSI cable (between coprocessor on WSI2 board and HDDT)
CE compliant 51304913-200	HDDT I/O board (interfaces to the rear of the HDDT)
Non-CE compliant 51304913-100	
51191982-100	SCSI terminator (for SCSI termination on HDDT I/O board)

11.7 DAT Tape and Associated Parts

Introduction

ATTENTION

The DAT drive may be mounted in one of three (3) possible cabinet configurations. They are:

- Ergonomic furniture Station
- Classic furniture Station
- Table-top work surface (adjacent to Station containing the AXM node)

There are part differences associated with these configurations. Separate parts lists for each possible cabinet arrangement are provided. Be certain you are using the appropriate parts list when ordering parts.

DAT drive in ergonomic furniture station

The following table provides the part numbers for the optional DAT tape drive and its associated parts when it is installed in the ergonomic style console furniture.

Table 11-8 DAT Drive and associated spare parts

Assembly Number	Description
51196257-100	Digital Audio Tape (DAT) drive--2 GB
51196257-200	Head cleaning cassette
51191814-100	Scratch tape media (4mm/2GB)
51192054-101	DAT/CD-ROM SCSI interface cable [runs between the HDDT I/O board and ESD shield (feedthrough) into drive enclosure]
51305070-200	DAT/CD-ROM SCSI interface cable [runs between the ESD shield (feedthrough) into drive enclosure] and the device inside
51305070-100	DAT/CD-ROM SCSI interface cable (Replaces 51305070-200 above if a Cartridge drive is also installed in the same drive enclosure.)
51308080-200	Device DC power cable
51304769-100	Device DC power cable (Replaces 51308080-200 above if a cartridge drive is also installed in the same drive enclosure.)
51192107-300	Ferrite ESD shield (feedthrough connector assembly of drive enclosure)
See cartridge drive option in US or UXS Service manual.	Peripheral Power Supply

DAT drive in classic furniture station

The following table provides the part numbers for the optional DAT tape drive and its associated parts as it appears in a Classic Furniture style station.

Table 11-9 DAT Drive and associated spare parts

Assembly Number	Description
51196257-100	Digital Audio Tape (DAT) drive--2 GB
51196257-200	Head cleaning cassette
51191814-100	Scratch tape media (4mm/2GB)
51304769-201	Drive DC power cable
51192054-102	DAT/CD-ROM SCSI interface cable [runs between the HDDT I/O board and ESD shield (feedthrough) into drive enclosure]
51305070-200	DAT/CD-ROM SCSI interface cable [runs between the ESD shield (feedthrough) into drive enclosure) and the device inside]
51195124-100	Fan assembly/with power cable
51201201-500	Air filter
See cartridge drive option in US or U^{X}S Service manual.	Peripheral power supply

DAT drive in ergonomic or classic table-top work surface

The following table provides the part numbers for the optional DAT tape drive and its associated parts as it appears in a table-top work surface which is adjacent to the station containing the A^{X}M node.

Table 11-10 DAT Drive and associated spare parts

Assembly Number	Description
51196257-100	Digital Audio Tape (DAT) drive--2 GB
51196257-200	Head cleaning cassette
51191814-100	Scratch tape media (4mm/2GB)
51304769-301	Drive DC power cable
51192054-103	DAT/CD-ROM SCSI interface cable [runs between the HDDT I/O board and ESD shield (feedthrough) into drive enclosure]
51305070-100	DAT/CD-ROM SCSI interface cable [runs between the ESD shield (feedthrough) into drive enclosure] and the device inside
51195124-100	Fan assembly/with power cable

11.8 CD-ROM and Associated Parts

Introduction

ATTENTION

The CD-ROM drive may be mounted in one of three (3) possible cabinet configurations. They are:

- Ergonomic furniture Station
- Classic furniture Station
- Table-top work surface (adjacent to Station containing the AXM node)

There are part differences associated with these configurations. Separate parts lists for each possible cabinet arrangement are provided. Be certain you are using the appropriate parts list when ordering parts.

CD-ROM in ergonomic furniture station

The following table provides the part numbers for the optional CD-ROM and its associated parts as they appear in a Ergonomic furniture style station..

Table 11-11 CD-ROM and associated spare parts

Assembly Number	Description
51196480-100	CD-ROM drive
51190624-900	Pinning jumper (several required for termination power & SCSI device address)
51192039-122	SCSI interface termination resistor (need 2)
51192054-101	DAT/CD-ROM SCSI interface cable [runs between the HDDT I/O board and ESD shield (feedthrough) into drive enclosure].
51305070-200	DAT/CD-ROM SCSI interface cable [runs between the ESD shield (feedthrough) into drive enclosure] and the device inside.
51308080-200	Drive DC power cable
51192107-300	Ferrite ESD shield (feedthrough connector assembly of drive enclosure)
See cartridge drive option in US or UXS Service manual.	Removable media tray assembly (includes fan and power supply)

CD-ROM in classic furniture station

The following table provides the part numbers for the optional CD-ROM and its associated parts as they appear in a Classic furniture style station..

Table 11-12 CD-ROM and associated spare parts

Assembly Number	Description
51196480-100	CD-ROM drive
51190624-900	Pinning jumper (several required for termination power & SCSI device address)
51192039-122	SCSI interface termination resistor (need 2)
51192054-104	DAT/CD-ROM SCSI interface cable [runs between the HDDT I/O board and ESD shield (feedthrough into drive enclosure)]. Not required if mounted with another UNIX device (i. e. DAT) in the same enclosure.
51305070-200	DAT/CD-ROM SCSI interface cable [runs between the ESD shield (feedthrough) into drive enclosure] and the device inside. Not required if mounted with another UNIX device (i. e. DAT) in the same enclosure.
51304769-201	Drive DC power cable
51195124-100	Fan assembly
51201201-500	Air filter

CD-ROM in ergonomic or classic table-top work surface

The following table provides the part numbers for the optional CD-ROM and its associated parts as they appear in a Classic table-top work surface..

Table 11-13 CD-ROM and associated spare parts

Assembly Number	Description
51196480-100	CD-ROM drive
51190624-900	Pinning jumper (several required for termination power & SCSI device address)
51192039-122	SCSI interface termination resistor (need 2)
51192054-103	DAT/CD-ROM SCSI interface cable [runs between the HDDT I/O board and ESD shield (feedthrough) into drive enclosure)].
51305070-200	DAT/CD-ROM SCSI interface cable [runs between the ESD shield (feedthrough) into drive enclosure] and the device inside.
51304769-301	Drive DC power cable
51195124-100	Fan assembly (includes power harness)

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